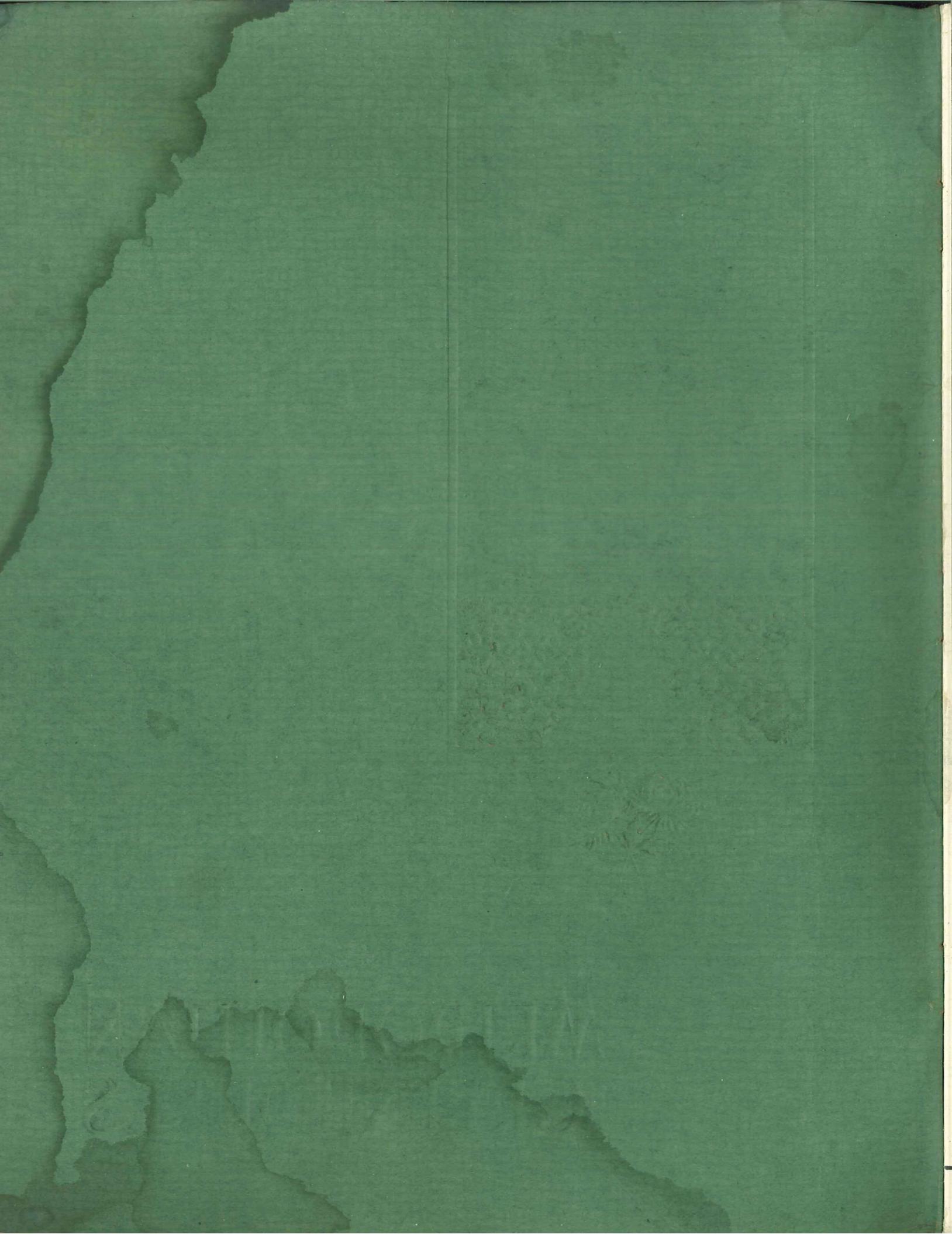


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METROPOLITAN  
GREENHOUSES



# METROPOLITAN GREENHOUSES

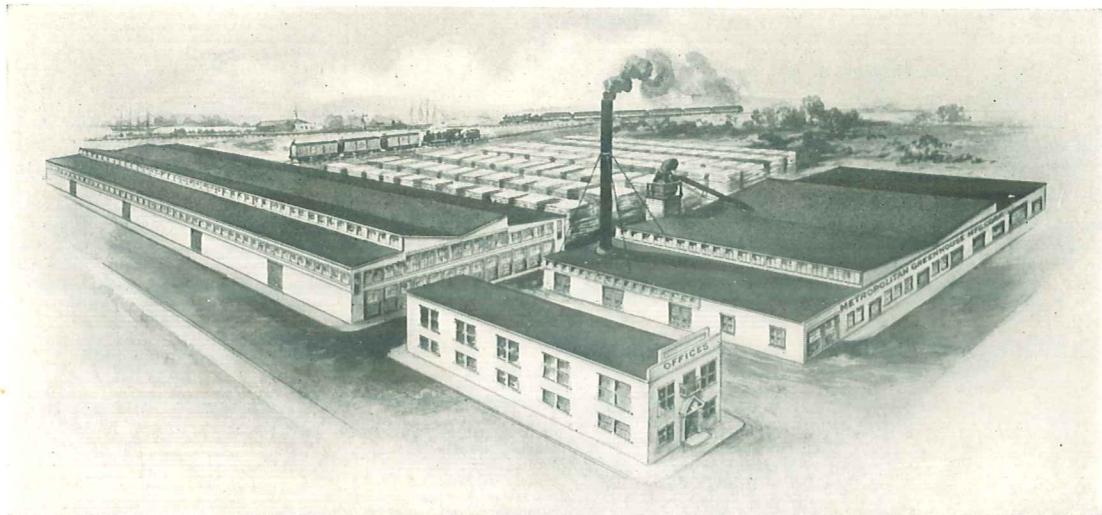
*M*ETROPOLITAN HOUSES appeal particularly to the man with hard-earned money—who wants something good at reasonable cost, knows good construction when he gets it and must be shown before having to pay the bill.

Catalog  
No. 1031

**METROPOLITAN  
Greenhouse Mfg. Corp.**

ESTABLISHED 1871

1851 Flushing Ave., Brooklyn, N. Y.



Main plant of Metropolitan Greenhouse Mfg. Corp., Brooklyn, N. Y.

**T**HIS catalog is devoted exclusively to Metropolitan Greenhouses. If you are particularly interested in Heating Systems, Boilers, Pipe and Pipe Fittings, Ventilating Apparatus, Hotbed Sash, etc., tell us your needs and we will send special bulletins on these subjects.



METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N.Y.

**Metropolitan Greenhouses offer a wide selection  
to meet any commercial or private need**

THE general designs and details have been standardized to the greatest practical extent for strength, stiffness, full penetration of daylight, thorough ventilation, simple, effective and economical heating, fullest utilization of bench space, ease of erection, convenient access for daily work and annual overhauling, trim appearance and extremely long life of all parts, and last but not least, to provide these combined advantages at a moderate cost that is within the reach of any pocketbook.

The excellence of these Metropolitan designs comes from 60 years of progressive greenhouse engineering experience, from constant improvement as dictated by the performance of older constructions of many years standing, and from the Metropolitan determination to produce absolutely the most durable and satisfactory houses that money can buy.

With the latter aim, the Metropolitan Engineering Staff has originated and developed many of the best features of modern greenhouse construction and has equipped the large Metropolitan plant with every facility for improving material finish and for low-cost quality production of every important greenhouse essential. The Metropolitan plant is today the outstanding one in the industry for completeness of equipment, amount of material handled, diversity of products made, and finished stock on hand and its entire output has long enjoyed an enviable reputation.

**We will build your houses  
or sell you the material**

**M**ETROPOLITAN will either erect and deliver your greenhouse plant complete with or without heating and benches, or will sell you all necessary material and provide the plans from which you can do your own erecting.

Whichever you choose, you are entitled to the free preliminary advice and co-operation of an experienced Metropolitan Engineer. This man will help you to determine what size and type of house or houses you should build, will explain the relative merits and costs of different types of

structures, will post you on various material and construction details, will suggest suitable arrangement with proper bench and piping layouts, will show you how your own ideas can be best applied and will assist in compiling the schedule of necessary material.

## Where the erection work is put into our hands

OUR proposition will specify a definite delivery date and unconditionally guarantee all workmanship and material to be strictly first class, and where desired, a bond will be posted to assure complete and perfectly satisfactory delivery within the time limit. Where heating is included, our responsibility covers correct circulation and ample boiler and coil capacity in the coldest weather, and our guarantee in respect to heating system material and performance is as rigid as on the structural work. Carefully detailed specifications covering the high quality of material and thoroughness of workmanship will be put into the customer's hands so that he may check up as the work progresses to make sure that he is getting everything exactly as represented.

A well qualified Metropolitan Official will assume direct charge of every detail up to final delivery and the work will be done by erecting men who have made greenhouse construction their life work. The Metropolitan Greenhouse Mfg. Corp. is the only greenhouse builder that puts one of its ablest Officials right on the ground to see that all details of every construction contract are correctly executed.

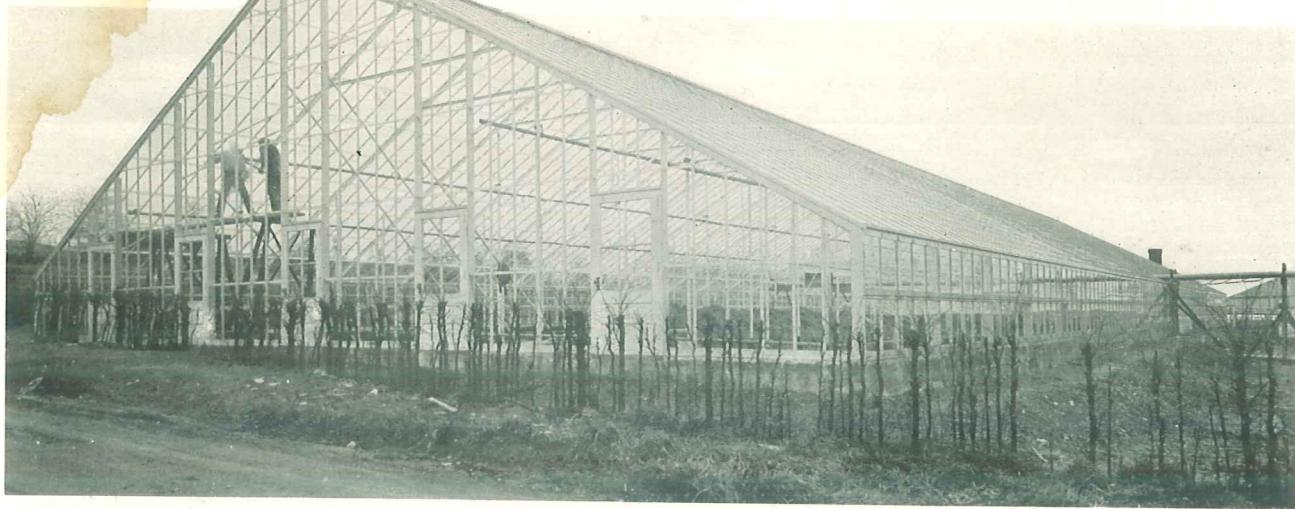
### If you prefer to do your own erecting

OUR complete plans which are furnished without extra charge, make the work as simple as possible, and you will save time, worry and much money by buying all the material in one safe place.

We can furnish everything you need—posts, rafters, columns, eave and gutter plates, ventilating apparatus and sash, glass, paint, putty, hardware, boilers, pipe, fittings, brackets, etc., for houses of any size and all of the very best quality.



Located 1600 feet up on the side of a mountain these  
Metropolitan Greenhouses produce good crops



THE Metropolitan range of greenhouses of Mr. T. Malbranc, of Johnstown, Pa., is up on the side of the mountain, 1600 feet above sea level in a location well known for its cold and windy exposure. Mr. Malbranc knew in advance that he would have to have the best of heating equipment and good tight houses with perfect glazing.

Mr. Malbranc built for his first houses in 1925 two Metropolitan Semi-iron-frame High-eave Greenhouses 34 ft. 8 in. x 207 ft. His next, built in 1926, was a Metropolitan Iron-frame Greenhouse 60 ft. x 207 ft. Again in 1927 he built another Metropolitan Iron-frame Greenhouse 68 ft. x 207 ft., and finally in March, 1929, had another house built exactly the same as the 1927 house.

Mr. Malbranc planted roses in his new houses on April 28th. Three months later when this picture was made, the plants were

24 to 36 inches high. On September 1st, 60,000 blooms, averaging six to the plant, were cut.

Although the heating boilers were located 1000 feet from the greenhouses, Mr. Malbranc says that his heating plant very satisfactorily heats the houses in the coldest weather.

As an example of the small amount of radiation required only eight 1 1/4-in. lines (four on each side) are used in one of the iron-frame greenhouses. Considering the severe conditions, the total absence of heating troubles in the Malbranc plant, testifies strongly to the dependability and economy of Metropolitan Greenhouses.

When a grower builds Metropolitan Greenhouses, he is assured of long-life service and high producing capacity under the most profitable working conditions. Metropolitan houses pay for themselves in a surprisingly short time.





## METROPOLITAN GREENHOUSE MFG. CORP. BROOKLYN, N. Y.

If your order is for a standard Metropolitan Greenhouse, the material will come to you carefully packed and all iron work cut to size with holes all ready to receive bolts and nuts. Sash are trimmed to correct fit and if so ordered all wood is cut and spliced, and all wood and iron work is given a priming coat. The shipment will include all necessary paint, oil, putty, bolts, nuts, screws, nails, glazing points, hardware, etc.

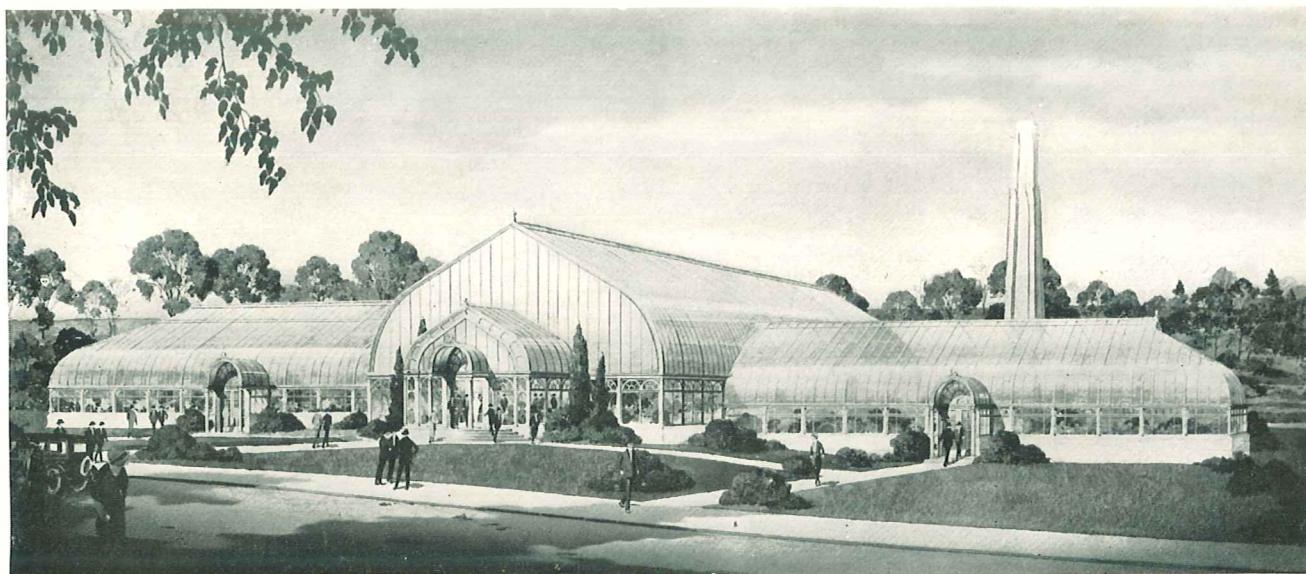
As the Metropolitan plant constantly carries heavy stocks of all construction material, you can depend upon getting your order filled completely and on time—and when and wherever the erecting involves problems on which you want advice, quick co-operation is yours for the asking.

### Metropolitan strives for permanent satisfaction to every customer

WHETHER we build your houses or whether you do the work yourself with Metropolitan material, Metropolitan aims to give such good value that you will come to us again when you need more houses or material. Every Metropolitan transaction is characterized by scrupulous honesty and unending friendly interest.

We will gladly refer you to any number of owners of Metropolitan Houses who can testify to the square deal they received and who will enthusiastically show you how well their Metropolitan Houses have stood every test of time.

### Metropolitan Conservatory for Cincinnati Park



METROPOLITAN was recently awarded the contract by the Board of Park Commissioners, Cincinnati, Ohio, for the building of palm and show houses for Eden Park.

The work consisted of a palm house 60 ft. x 159 ft. 1 in.; two wings, each 41 ft. 10 in. x 100 ft. 9 in.; a propagating house, 25 ft. 2 in. x 50 ft. 11 in., and a passageway 8 ft. 6 in. x 8 ft. 4 in.

The picture shows the greenhouses as originally planned but the finished houses had a few changes, such as three sets of double doors of modernistic design

made of aluminum and glass for the main palm house and one set for each wing, also an elaborate marquee built over each entrance; the marquee is composed of aluminum members also of modernistic design.

The steam heating system was furnished complete by Metropolitan, with the exception of the boiler.

Before placing the order with Metropolitan, Park Officials came from Cincinnati, Ohio, and carefully inspected the Metropolitan plant. After seeing the modern and up-to-date plant, they immediately placed the order for these fine show houses.

"I get a lot of pleasure out of these greenhouses. I consider Metropolitan cypress bars, eave gutter and sill design, ventilating apparatus, bench fittings, glass, etc., the best, and the prices are reasonable. Their houses let in more light, are stronger under wind and snow load, and keep out the cold better than other houses I could have bought at the same cost. No glass has

cracked in these greenhouses, and they heat easier and more economically than the four greenhouses they replaced.

"The combination of your own good practice and my ideas has worked 100 per cent. I would buy from Metropolitan again if I needed more greenhouses."

—A. M. Henshaw, Millburn, N. J.



## Private greenhouses for residences and estates

THE Metropolitan Iron-frame Greenhouses with curved eave make a handsome showing on private estates or in parks and require no other maintenance attention than occasional painting. This and other standard types obtainable in any desirable length and width, planned to fit the space, will be erected by us complete and ready to receive the growing plants.

Many of the smallest Metropolitan Greenhouses shown in the following pages are excellent for the amateur who wishes to supply his home all the year around with flowers, plants and vegetables from his own conservatory. Where wide variety of stock grown, propagating, etc., make several sets of temperature and moisture conditions desirable, any Metropolitan Greenhouse can be divided into compartments with different amounts of heating surface and ventilation.

Attaching to the side of the home or garage saves the cost of one greenhouse end, and enables one heating system to serve both structures with very little, if any, added attention.

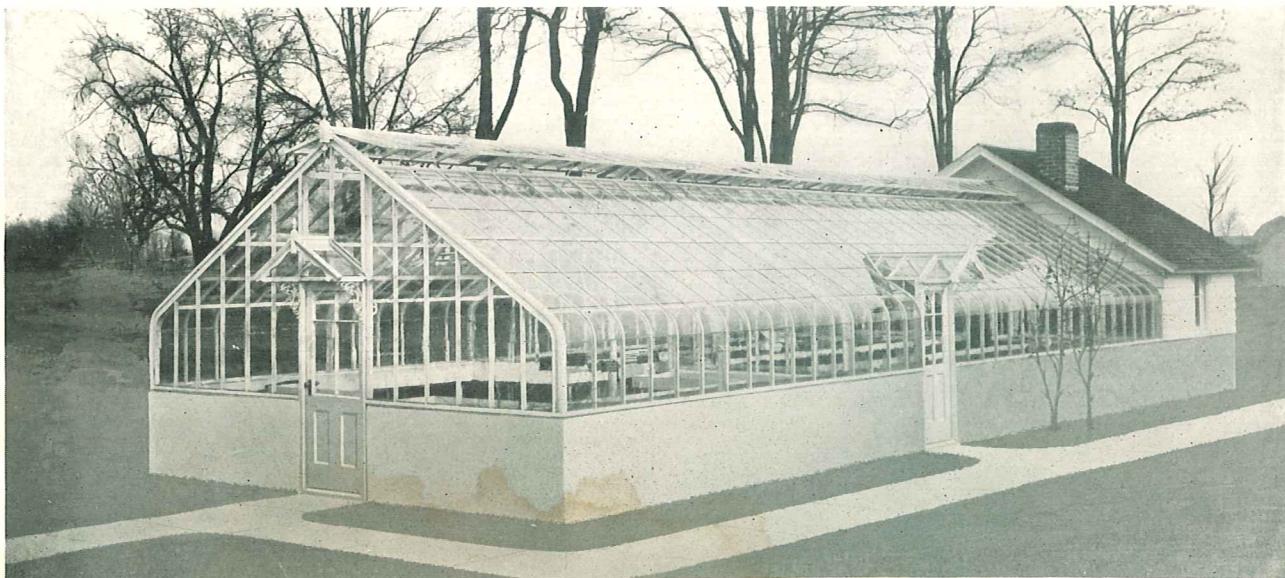
Small lean-to greenhouses must fit the available space and harmonize with surroundings. Metropolitan Lean-to Greenhouses are especially de-

signed to combine adaptability, convenience, maximum bench space and other desirable features. Lean-to greenhouses should be located on the south side where open to the most sunshine, but protected from the coldest winds, they are easiest to keep heated.

Small greenhouses attached to garages need not have a special work room if a little space is available in the garage, but independent greenhouses should have an adjoining small service house in which potting and odd jobs can be done and in which the heating boiler can be placed.

Small independent Metropolitan Greenhouses, like their larger commercial brothers, can be heated by steam or hot water, using coal or oil for fuel. With the latter, the temperature can be automatically and precisely maintained at the desired degree exactly as an oil burner heats the home. With coal firing, hot-water heating is recommended as better for uniform temperature where a fireman is not in constant attendance.

If you are doing a retail business, good display will improve the appearance of your foliage and blooming plants, enable you to sell them for better prices, and will add to the reputation of your firm.



Metropolitan Curved-eave Greenhouse erected for Mr. Post at Battle Creek, Mich. The graceful lines and the solid construction of this type are always favorably commented upon by the "knowing ones."



METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N. Y.

## Metropolitan Curved-eave Greenhouse for Port Washington Estate



ONE of two 18-ft. x 49-ft. 8½-in. Metropolitan Curved-eave Iron-frame Greenhouses built with connecting passageways to two existing greenhouses of other make, for Mrs. C. R. Holmes, Port Washington, L. I., Mr. Louis Tieman, Architect. Our con-

tract included the heating system. The Metropolitan Greenhouses proved so satisfactory that the two additional Metropolitan Greenhouses, shown below, were ordered within the next two years.

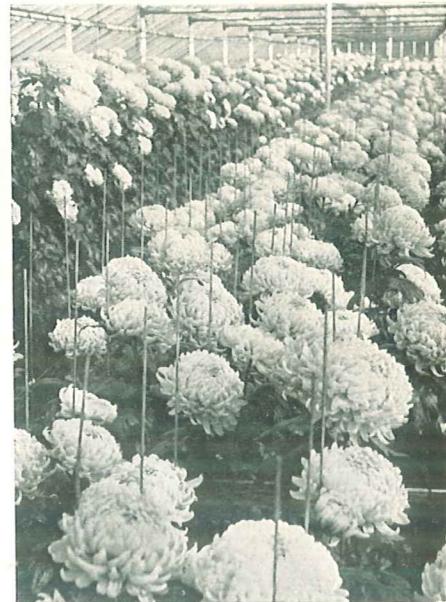
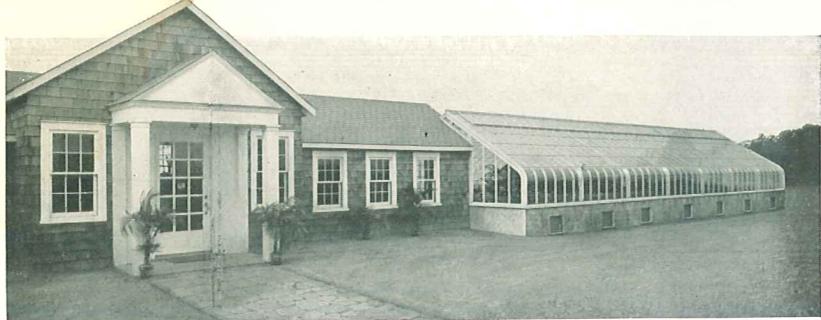


THE third and fourth Metropolitan Greenhouses built for Mrs. C. R. Holmes, Port Washington, L. I., also under direction of Mr. Louis Tieman, Architect. The third is the lean-to greenhouse shown in the background. The fourth is a 3-compartment 35-ft. x 124-ft. Metropolitan Curved-eave Iron-frame Greenhouse of curved truss construction without inside columns. The com-

partment nearest the boiler is dropped 3 ft. below the others to conform to the slope of the ground. Furnished complete with Metropolitan hot-water-under-pressure heating system and with iron-frame tile bottom with slate side benches. The Architect has expressed the opinion that this is one of the finest greenhouses ever built.

"Metropolitan prices are reasonable, and Metropolitan plans and specifications are excellent. The small but well equipped greenhouse we purchased from this firm is in every way satisfactory. Its gutters, ventilating apparatus and cypress bars are very attractive."—Horace G. Ripley, Brattleboro (Vt.) Retreat.

"I preferred the Metropolitan because it is higher at the ridge, and because I could not see where other builders were offering me anything better at higher prices. Metropolitan co-operated in every way. If I ever build again, it will be another Metropolitan Greenhouse."—Joseph Mayer, Patchogue, L. I.



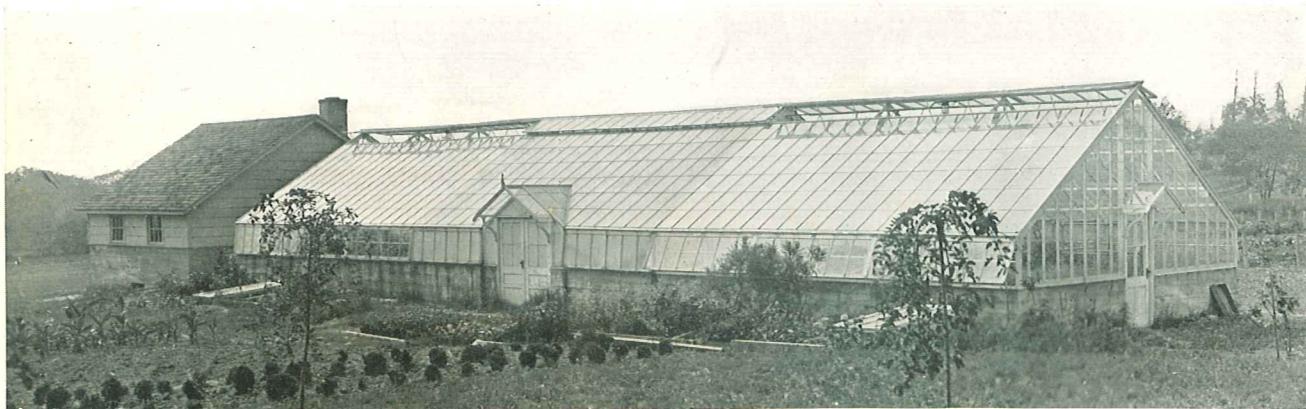
METROPOLITAN Curved-eave Iron-frame Greenhouse with pipe-frame benches built for a sanitarium in Pinehurst, N. C. The owner writes us: "This is our exhibition and show place, visited daily by people from all over the country. We are very well pleased, and would purchase again from Metropolitan."

We can build you a display house, standard construction or special lean-to, with slate, tile or wood benches, etc., that will do credit to any neighborhood and is very easy to keep in spic-and-span condition.

As a service to Architect or Owner, we gladly suggest tentative plain or ornate designs and furnish complete working drawings, material specifications and cost data for construction that fits in properly with architects' drawings or existing structures. Where desired, a Metropolitan representative will first go over the ground, explain the

advantages and costs of different types of construction and suggest possible desirable alternate arrangements, in order that the customer will be assured of the most for his money.

"If I ever build again, it will be another Metropolitan Greenhouse. Metropolitan treated me very fairly, sent plenty of material, everything correct, shipped promptly and gave me a good price. I am well pleased with everything, especially cypress bars and eave, gutter and sill design."—J. A. Meyer, Marydel, Del.



Special 3-compartment 25-ft. x 75-ft. Metropolitan Greenhouse and service house which we erected complete including heating and benches on the estate of N. Jonas, Great Neck, Long Island.



## Suitable width and length of house

WHETHER a given ground area should be covered by long or wide houses or a greater number of narrower or shorter houses depends upon many conditions.

Narrow houses are thought to be best for certain kinds of plants and where different kinds of plants grown in small quantity call for widely differing moisture, temperature and ventilating conditions, a group of narrow or small houses is naturally more practical than fewer larger or wider ones, although the latter divided into compartments may possibly solve the problem in a better way. Very narrow houses are used principally as private conservatories and in commercial establishments for propagating and for joining wider houses to each other or to the service house.

Where cut flowers or vegetables are grown on a large scale, large wide houses are unquestionably the best from every standpoint. The light is stronger because of proportionately less overhead structure and is more uniformly diffused.

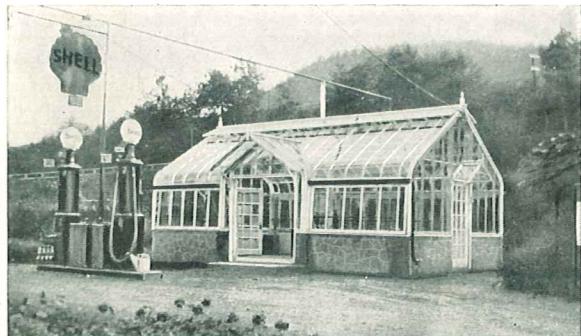
The thicker and fresher air blanket with its far greater volume of warm air stimulates better growth, and tempers cold air from the ridge ventilators before it can reach and stunt the plants. The temperature regulation is therefore more uniform, as the big mass of tempered air regulates changes in the same way that the fly wheel on an engine prevents sudden speed changes.

No one will deny also that the large house is more convenient and economical in watering and other attention to plants, that the ventilators are quicker served in an emergency and that the labor costs in the summer overhauling of benches and renewing of soil are much less.

A given area covered by large houses has a considerably larger percentage of useful and more efficient bench space than the same area covered by smaller ones, and less ground is wasted between houses.

Likewise the construction cost per unit area is slightly less through the smaller number of side walls, ridges, and ventilators.

## Here is an excellent and profitable idea



**S**HAW THE FLORIST," of Shelburne Falls, Mass., got the idea that combining a show greenhouse and gasoline filling station on a main automobile road was good business. He figured that the gasoline facilities would flag more flower customers, and that the additional sales of flowers and plants plus the income from the gasoline would pay a good return on the investment.

Mr. Shaw saw the wisdom of making the place attractive so he bought the material for a Metropolitan Curved-eave Iron-frame Greenhouse and had one of our Erecting Foremen supervise the construction. He has now proven that his scheme is a good one.

Anyone who understands human nature can realize that the florist who puts up an attractive, well located show house with facilities for giving service to passing motorists has an excellent chance to reap a highly profitable reward.

First, motorists' comforts compel thousands of stops which would otherwise never be made. Second, many more people will buy plants and flowers when they can do so without going out of their way. Third, others who never dreamed of buying are attracted while waiting for a crank case or gas tank filling, and the sight of handsome plants and flowers stimulates a desire, especially to the man who is in a hurry. Plant and flower sales well replace money otherwise spent for candy. Fourth, by giving the motorist extra conveniences and comfort, you create a friendly spirit and some purchases at least will be made in this spirit.

You, as a wholesale grower, can make arrangements with prospective gasoline stations for building sales conservatories in any number of locations and create a market of substantial volume for your production in addition to getting very profitable retail prices for your surplus.

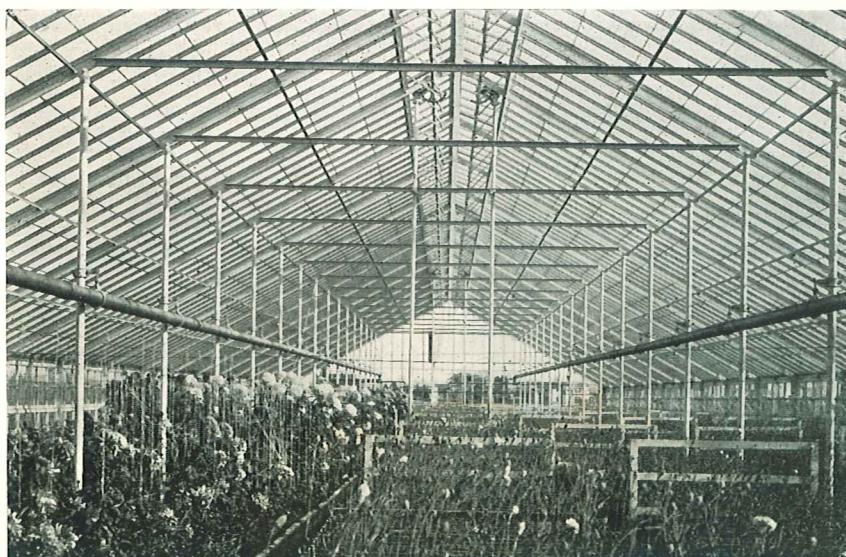
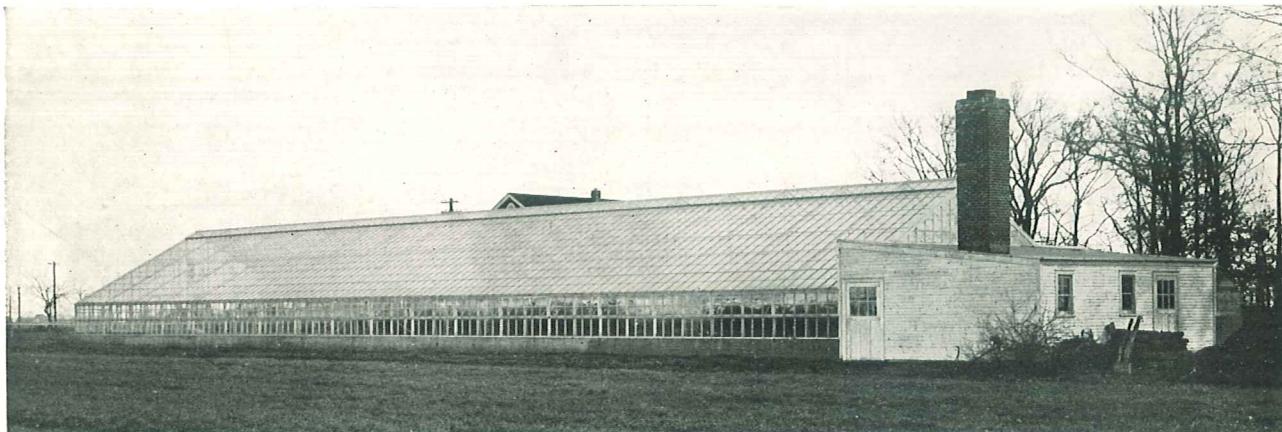


## "It's the tightest house that money can buy"

**G.** MUHLHAUSER of Woodhaven, L. I., 28 years ago built a range of Metropolitan Greenhouses that have proven a fine investment and are still good today. When his son, Frederick C. Muhlhauser, wanted to build a year ago in Hicksville, L. I., he had 28 years' experience with Metropolitan construction and he knew the Metropolitan way of dealing. Quite naturally, therefore, he was glad to turn the job over to us complete, including the heating system and benches, and with instructions to give him the best. Now, when you ask Mr. Muhlhauser about this fine 42-ft. x 150-ft. Metropolitan Iron-frame Greenhouse, as shown in the pictures, he is all enthusiasm.

He says: "My Metropolitan Greenhouse speaks for

itself. You can see the evidence of fine material and good workmanship at every point. The painters and glaziers did an exceptional job. You can't find a cracked light and it's the tightest house you can buy. Always plenty of heat and evenly distributed. The ventilators are easy to operate, and when open have no tendency to looseness in a wind. Everything is solid as a rock. When there's a wind, we get the limit out here, but nothing gives and no glass breaks.—And after all the friendly help I got from Metropolitan, the speed with which they finished my job, and the reasonable prices they gave me, you can be sure that when I build again, my next house, too, will be a Metropolitan."



Exterior and interior views of the 42-ft. x 150-ft. Metropolitan Iron-frame Greenhouse of Frederick C. Muhlhauser at Hicksville, L. I.

"I selected a Metropolitan Greenhouse because I liked it better than others at same or greater price. The material was shipped promptly and all dealings were satisfactory."—Laurensburg (N. C.) Floral Shop.



## Separated or joined houses

THIS is a question which some growers prefer to settle one way and some the other. In many locations and with many kinds of plants either is practical.

In regions of very heavy snowfall, the danger of imposing excess weight on the roof should not be risked, and in any location joined houses cannot be as well ventilated as separated houses with side-wall ventilators. On the other hand, divisions (if used at all) under gutters are certainly much cheaper than a greater number of complete side walls, and where greenhouses are built in cramped locations and on valuable land, the space saving

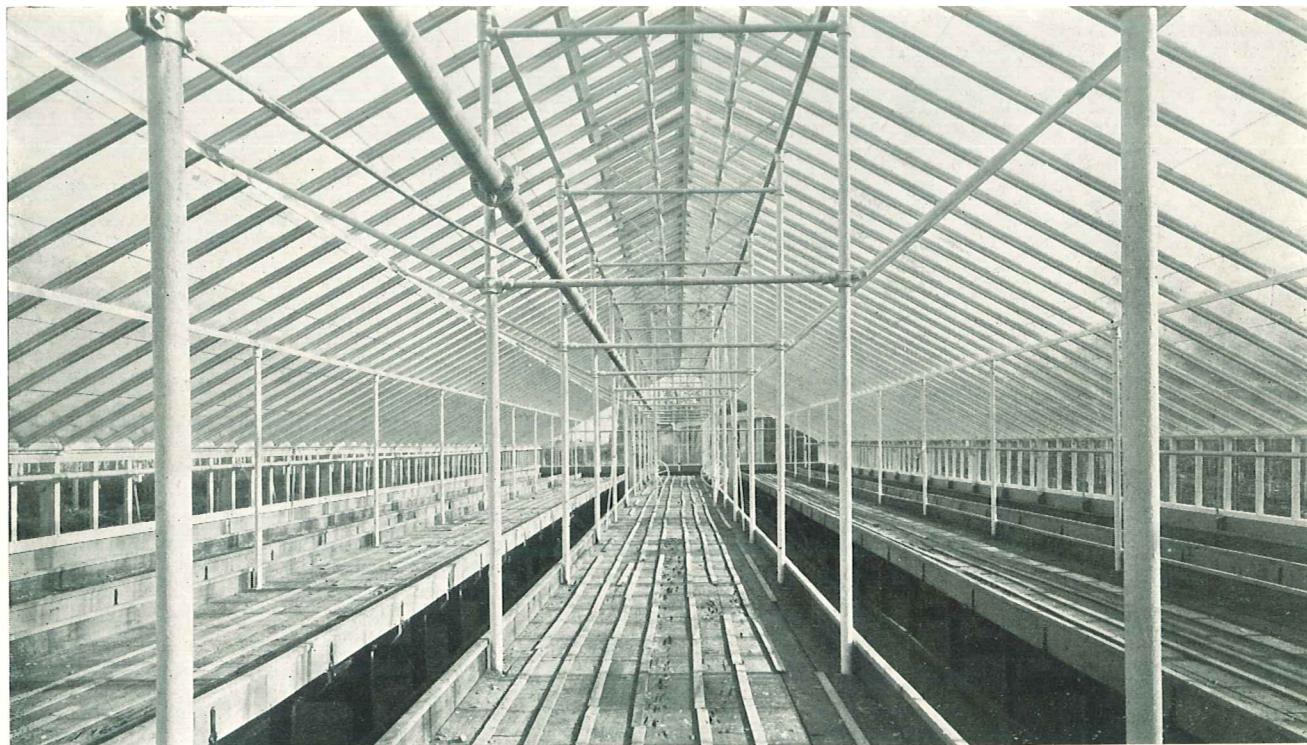
and additional bench space may be an important consideration.

Separate houses have better light as they avoid the gutter shadows, which with the low winter sun are decidedly objectionable at the time of the year when light is most needed.

Separated houses, being individual units, confine accidental cold entry to the house in which it occurs, where joined houses with no separating partitions may jeopardize the plants in all.

Insofar as heating is concerned, joined houses are slightly more economical in fuel, but the general arrangement of piping is similar.

## This Long Island Grower has 16 Metropolitan Greenhouses



THE C. C. Trepel plant at Farmingdale, L. I., covers 150 acres, has over 100,000 sq. ft. of glass and does the biggest retail plant business in New York. Four main crops are grown, respectively for Easter, Spring bedding, Thanksgiving and Christmas. These include palms, ferns, pandanas, hydrangeas, roses, lilies, tulips, etc.

The plant was started with greenhouses of other make, but in 1927, three 29-ft. x 183-ft. and one 25-ft. x 200-ft. Metropolitan Greenhouses were built. These proved so satisfactory that in 1929, a range of six connected 33-ft. 4-in. x 100-ft. Metropolitan Greenhouses and another similar range of six 29-ft. 8-in. x 100-ft. Metropolitan Greenhouses were built. A typical one of these twelve greenhouses as delivered ready for putting soil in the benches is shown above. Each range has at one end an 8-ft.

connecting lean-to with potting bench. Metropolitan furnished these houses complete including erection of heating system and benches. The latest range is about 500 ft. away from the boiler, but is easily heated with a pressure of one pound at the boiler.

That Mr. Trepel is a firm believer in Metropolitan Greenhouses is indicated by the following comment:

"Your excellent work in the twelve greenhouses and adjoining lean-to speaks volumes for your organization."

"We appreciated the constant personal interest and attention of your executives in offering valuable suggestions while erection was in progress.

"Your workmen were as gentlemanly and skilled a body of mechanics as we have seen, and as for your materials, money cannot buy finer than a Metropolitan Greenhouse."



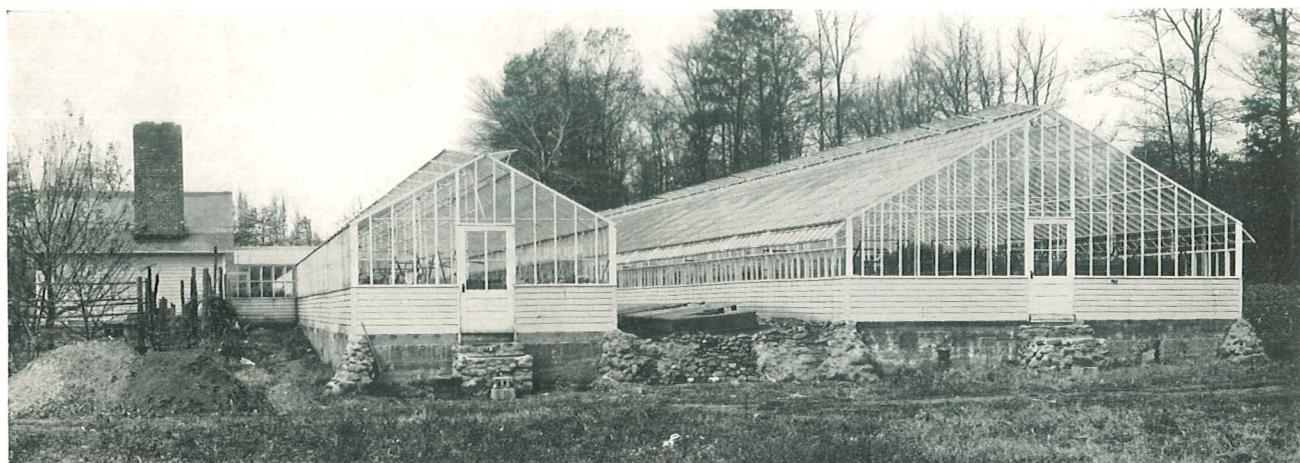
## Metropolitan Greenhouses are built with high or low-eave

METROPOLITAN designs include two general heights of side, designated respectively as low-eave and high-eave. The low-eave type has a single row of stationary lights or a row of ventilating sash between the eave and the top of the solid wall. The high-eave 7-ft. type has a row of ventilating sash under the eave and a row of stationary sash between the ventilators and the top of the solid wall. In both constructions the solid wall may be either concrete or wood and is usually from 2 ft. to 3 ft. high.

Both have their advantages so the choice depends upon what is to be grown in the house. The low-eave type lets in the maximum of light, but

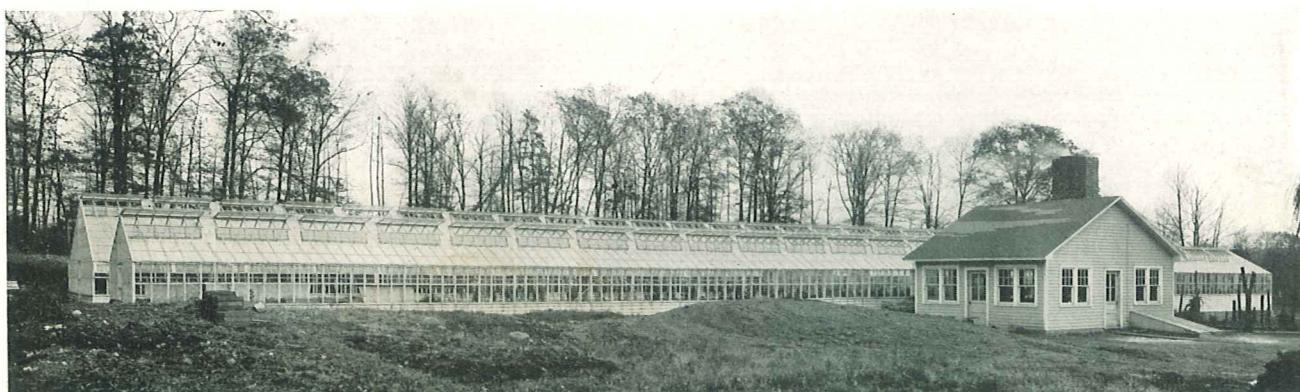
when the benches are placed against the side, some of the plants are subjected to the colder air in winter. The high-eave type, on the other hand, permits tall plants to be grown on raised benches or in solid beds on the ground, and has enough head room at the side walls to permit placing of walks next to the walls. All plants can therefore be surrounded by an effective blanket of warm air.

In the warmer weather, the ridge ventilation, in connection with that at the side, sweeps out the excessive heat in either type with side ventilating sash, permitting better temperature regulation.



METROPOLITAN Semi-iron-frame Greenhouses, 17½ and 31½ ft. wide x 200 ft. long.  
Built at Fanwood, N. J., for Wm. F. Saville, who says:

"You haven't heard me say much about my Metropolitan Houses. No need to. Everything is satisfactory and I am more than pleased. Your workmen are exceptional."





## Arrangement of benches in Metropolitan Greenhouses

WE build in or furnish the material and fittings for benches of all desirable types and widths, and where left to our judgment we select what appears to us best for the width of the house and the kind of crop to be grown.

The bench arrangement and width of narrow greenhouses are generally dependent upon each other, but in the wider houses variation is often practical. Although certain kinds of plants grow best and can be cared for best in benches of rather definite width, the proper dimensions for many others is a question on which reliable authorities have decidedly different views.

The bench arrangements and dimensions indicated on sectional drawings of Metropolitan Greenhouses shown in this booklet are the most popular ones and those which in our judgment are most practical for convenience, efficient growing and maximum capacity. We gladly make the spacing conform to individual conditions or ideas,

but in figuring changes from our suggested standards, walks should be located for convenient access to ventilators, and to avoid interference with columns.

When we build the benches and install the watering system, the hose bibbs at the walks are spaced close enough for the use of 25-ft. hose lengths.

For details of Metropolitan bench construction see Page 67. The designs shown there are all completely self-supported.

For solid beds we use rough common Tidewater Cypress posts and boards or concrete. For raised beds we use rough common Tidewater legs, cross pieces and ties with common dressed sides and Tidewater pecky cypress bottoms, laid either lengthwise or crosswise. We use no substitute lumber for cypress. For private greenhouses or conservatories, the pipe-frame bench with wood, tile or slate bottom is used with wood or slate sides.



**T**YPICAL interior view of 21-ft. wide Metropolitan Semi-iron frame Greenhouse, low-eave type, with two-row column supports, ridge ventilation on both sides, and Metropolitan Patented Cast-iron Eave and Gutter Plate. For exterior view, see Page 17.



## Ventilation and Ventilating Apparatus

VENTILATION at the ridge is obtained from one or two rows of continuous or non-continuous sash, depending upon the width and type of house. Side ventilation is optional in low-eave houses and provided in all high-eave 7-ft. houses. The roof sash for semi-iron-frame greenhouses have six 16-in. x 24-in. lights and are non-continuous. The roof sash for iron-frame greenhouses and all side sash are made with six 16-in. x 24-in. lights and are continuous. All have blind mortised and tenoned joints, and each sash is hung with three galvanized hinges having brass pins.

For the roof sash, Metropolitan No. 1 Ventilators are furnished with one gear set for each run. These machines are simple, positive through bevel and worm gearing, easily operated from a convenient wheel, self-locking in any position, and work rapidly but cannot slam in closing. The absence of chain eliminates the dangers from climbing of sprockets, sticking, and breakage of links.

For the side sash, Metropolitan No. 3 and No. 4 Ventilators are used. These machines possess all the advantages of the type used for the ridge ventilators, but have close-coupled or slightly ex-

tended handwheels as required. The ventilator shafting for both locations is 1-in. pipe with malleable iron shaft clamps at joints to prevent slipping. Where the individual runs of roof sash exceed 50 ft. in length, 1 1/4-in. pipe is used.

We manufacture our own ventilating apparatus. Metropolitan heavy-duty machines being equipped with ball bearings will raise 100 ft. of roof ventilating sash with ease. We do not know of any other ball-bearing greenhouse ventilating apparatus on the market. Our hangers are all equipped with brass rollers which permit the shaft to turn with the very least amount of friction, and with the greatest safe speed when getting ready for a storm. Individual sash runs are from 50 ft. to 100 ft. in length.

Although runs of greater length than these are used, the Metropolitan policy is conservative and we feel that very long greenhouses should have one ventilating machine for every 100 ft. or less of each run.

Growers who follow this recommendation in long greenhouses are able to maintain a more even temperature and at critical times are not confronted with serious ventilator troubles.

*Write for Metropolitan Bulletin No. 131  
describing this ventilating apparatus.*



Four 27-ft. 10-in. x 200-ft. Metropolitan Semi-iron-frame Greenhouses with 14 ft. x 133 ft. lean-to and combination boiler and packing house, built complete including benches, for M. Morgan & Son, Hackettstown, N. J., ready to receive the plants. The complete heating system was installed, including a Metropolitan tubular boiler, placed on grade.



## Metropolitan Greenhouse Plant on the estate of Mrs. Hamilton Rice in Newport, R. I.



THESE Metropolitan Greenhouses with service house are the last word in desirable construction for their purposes.

The two main greenhouses, 21 ft. and 17 ft. 6 in. wide respectively, are each 125 ft. long, are of the standard Metropolitan Semi-iron-frame Type, and are joined by a 20-ft. connecting greenhouse which is an excellent separate small unit in itself.

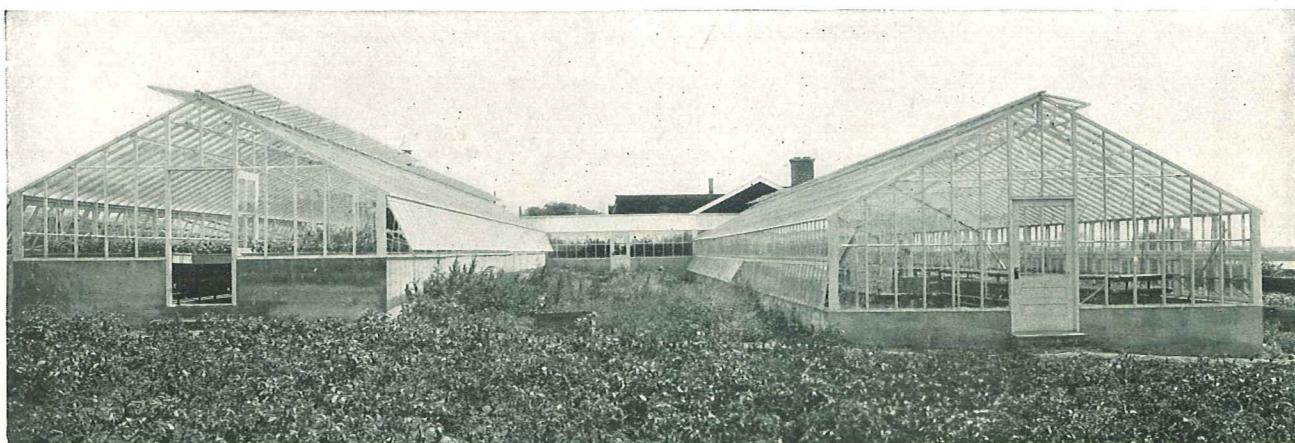
The wider of the two, to be used as a grapery, is divided into three and the narrower into two compartments and the connecting house forms a sixth. Each of the six compartments is under entirely independent heating control, so that six different sets of growing conditions can be made available, or the amount of space allotted to any smaller number can be proportioned and varied to meet any changing needs. Crops can be started at different times with proper heat at all stages, or part of a crop can be forced by heat while the rest is held back, either to provide for average rate of growth or blossoming or to provide a profuse crop at periods of increased demand. The connecting greenhouse is handy

for propagating and general purposes.

The heating system is of the type known as a hot-water pressure-gravity installation and is very flexible and efficient over a wide range of heating temperatures. Twin Metropolitan Sectional Boilers in the basement of the service house are so arranged that the heating load can be carried on either, or during periods of the extremely severe cold that occasionally develops in the neighborhood of Newport, both boilers can be put into service together.

The service house, 18 ft. x 23 ft., is a model for convenient arrangement and handsome appearance. The basement is divided into two parts, one for the boilers and the other for coal storage.

Our work included everything—greenhouses, service shed, foundations, heating system, benches—all delivered ready to receive the plants. The job was given to us by Mrs. Rice's representatives, Wadley & Smythe, Landscape Contractors, New York and Newport, because of thorough satisfaction from their previous purchases of Metropolitan Greenhouses.





## The glass, putty, paint and hardware

METROPOLITAN now uses and always has used the finest grades of these materials as dictated by their 60-year experience. All are so good that our guarantee is a mere formality—a protection which is there if you need it, but on which you would seldom have to fall back.

### Glass

The glass used as standard in all greenhouses furnished or built by us, is 16-in. x 24-in. double-thick, flat-drawn glass of greenhouse quality made especially for us and shipped in carload lots. This glass has the reputation of being exceptionally uniform in texture and is generally conceded to be the best for greenhouse purposes on the market. We could purchase glass at a lower

price but not equal in quality to this double-thick flat-drawn glass. All lights are *bedded* and secured to the bars with zinc glazing nails.

### Putty

The putty is made of pure linseed oil mixed with strictly pure ingredients which we grind in our own mill. Nothing goes in to bulk up the mixture or cheapen the quality. Metropolitan putty stays put, sticks and stays plastic long after the ordinary kind has cracked, crumbled and fallen away.

### Paint

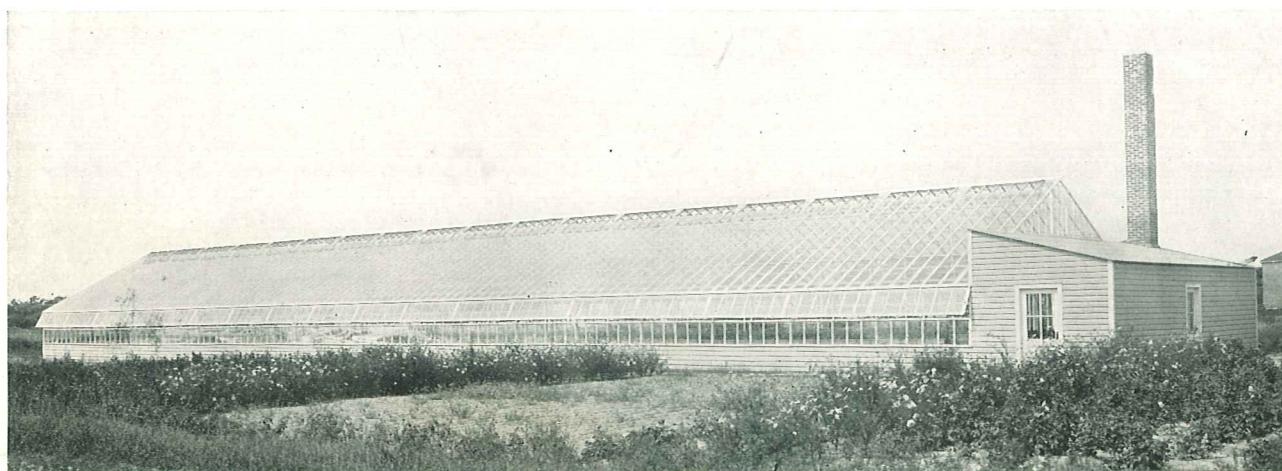
Woodwork in the superstructure is painted three white coats, and the iron work one red and



PETER FRANKENBACH, Bayport, L. I., had us take complete charge of the erection of his greenhouse.

We built the 34-ft. 8-in. x 150-ft. Metropolitan Semi-iron-frame Greenhouse shown, including the heating system, chimney, service shed and benches. Our men did all the masonry work, grading, etc., that is generally done by the owner, our executive supervised everything carefully, and we delivered Mr. Frankenbach's greenhouse ready for the soil in the benches and ready to start a fire in the boiler. Now he tells us:

"We are satisfied in every respect, recommend Metropolitan highly and will continue to do so."





## used in Metropolitan Greenhouses

two white coats. One coat is applied at factory and one coat after erection before glazing, and third or last coat after glazing. We use only pure linseed oil, turpentine, dryers, red lead, etc., of the best quality the market affords. The white lead is the Atlantic "Dutch Boy" brand, nationally advertised by the National Lead Company and accepted all over the world as the quality standard for protective paints that have the hardest work to do. The paint is mixed on the job and the grower can see that no substitutes are put in—no ready-mixed paint used at all. For the iron work, only National red lead ground in oil is used—no iron paint substitutes are permitted.

### Aluminum Paint

When requested we will paint first coat at shop with white paint on wood superstructure and red lead paint on iron work and one coat of aluminum after erection before glazing, and one coat alu-

minum after glazing. We use pure aluminum and aluminum vehicle as approved and specified by the Aluminum Company of America and mix same on the job.

### Hardware

Brass nails are used for roof and gable bars, gable rafters and vent headers. They cannot rust, loosen their hold or discolor the paint finish, and galvanized nails are used in the less exposed woodwork. Cadmium plated bolts are used at the eave plate, and in iron-frame greenhouses; those in semi-iron-frame greenhouses are black. We furnish solid brass mortise locks or galvanized thumb latches. Hinges for sash and doors are galvanized, have brass pins and are held by galvanized screws.

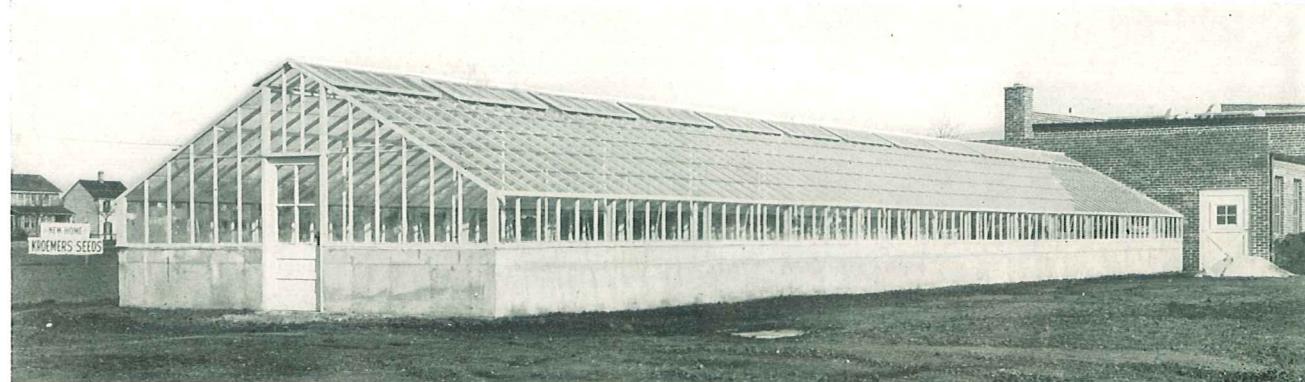
When we furnish material only, these sundries are provided in liberal enough quantity to assure complete furnishings to correct standard.



THE new seed plant of William Kroemer at Hicksville, N. Y., and its Metropolitan Semi-iron-frame Greenhouse. This 21-ft. house used for testing seed is built with concrete walls. An interior view is shown on Page 13. The Metropolitan Heating Boiler is fired by an oil burner, which keeps the inside greenhouse temperature very uniform, and requires practically no

firing attention. Mr. Kroemer states:

"This Metropolitan House is satisfactory in every respect. The material and workmanship are thoroughly first class and your price was reasonable. You met every guarantee and delivery promise, and your co-operation and service are much appreciated."





## Metropolitan uses only the best genuine Tidewater Gulf Red Cypress in greenhouse construction



This was once a sash bar!—but the owner bought just "cypress" instead of insisting upon *first-quality Tidewater Gulf Red Cypress* throughout. The early decay, especially at the end nearest the eave, soon made the house an expensive investment. *Don't make the same mistake.*

### You cannot afford to accept any other

**F**ROM the following facts, you will readily understand why you cannot afford to accept inferior cypress or a substitute. Cypress wood has always been known for its durability; like iron different kinds have vastly different worth. That which makes the best greenhouse material grows in swampy land in a very limited stretch of Louisiana and Florida where the tide ebbs and floods.

The decided superiority of cypress from this district comes from its exceptional resistance to destruction from moisture and its peculiar ability to permanently retain important traits of the living timber. Drive a nail into this "Tidewater Gulf

Red Cypress," pull the nail out, and the wood swells back to fill the hole, thereby keeping the timber sound at heart. Like the natural oils in leather, a natural element permits the "give" and "come-back" without destruction of the fibre. Cypress grown inshore and on the highlands does not have or retain this life-giving element to the same extent and either dries out and becomes brittle and weak, or in a greenhouse, absorbs moisture, rots like the bar shown above and must be renewed.

As Tidewater Gulf Red Cypress has long proven itself the only correct material for greenhouse superstructure and as heavy inroads by builders have almost exhausted the supply of desirable

The Florida mill from which our Tidewater Gulf Cypress comes—right on the spot where the cypress grows, up-to-the-minute in facilities and known to be the best equipped in the state for its purpose.





## METROPOLITAN GREENHOUSE MFG. CORP. BROOKLYN, N.Y.

standing timber, Metropolitan has established and constantly maintains connections at the point where the highest percentage of top-notch raw material is available. The cypress is rough sawed in the mill shown, and under the direction of an officer of the Corporation, only the best rough-cut timber with long straight fibre—the cream of this production—is selected. The rough boards are then piled and air dried in their native climate in the Southern yards for one or two years, then shipped direct to the Metropolitan finishing mill in Brooklyn, where the final milling and finishing is done.

We believe that we are the only greenhouse builders with such complete control and supervision of the timber from the time it is still standing. Our cypress requirements are anticipated years in advance, and finished pieces up to 24 ft. in length are manufactured and carried in stock in our own yards.

In the Brooklyn mill, the rough boards are given an additional critical inspection, and those which pass are put through special milling and finishing machinery that assures smoothness and perfect accuracy to correct grooves and bevel. Any raw or partially finished pieces that are found to contain knots, checks, cracks or sap streaks or other injurious defects are either rejected entirely or diverted to less important usage.

The Florida mill, with the added facilities in the Brooklyn plant, makes every provision for the

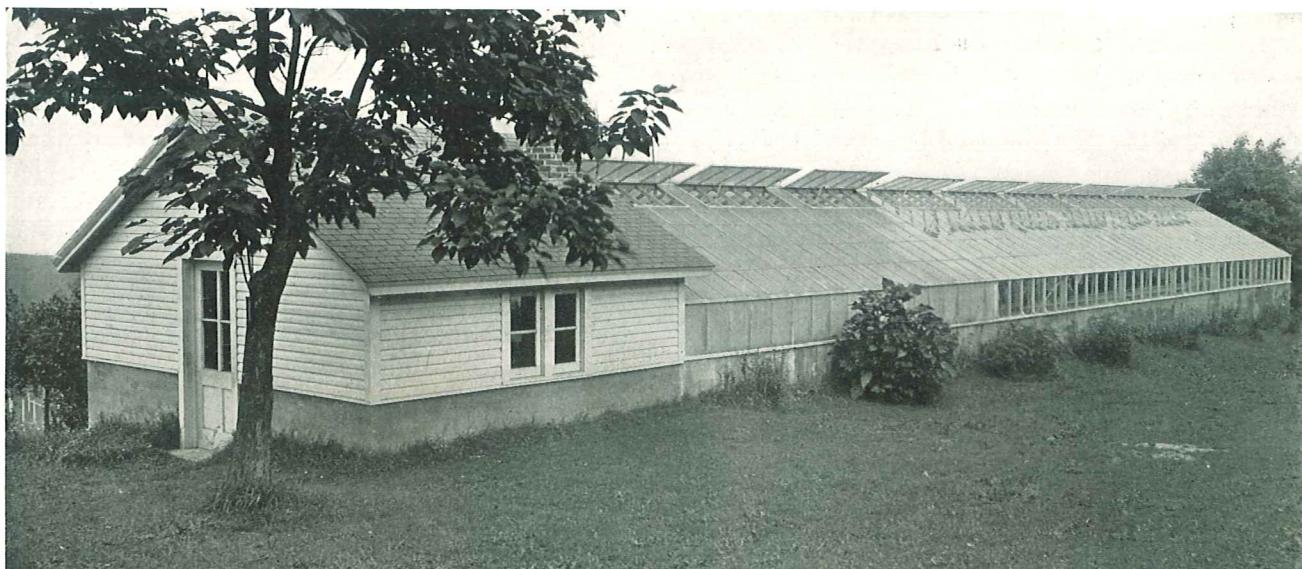
finest quality and finest workmanship at every stage from cutting of the timber to delivery of the finished cypress ready for greenhouse use.

To these facilities Metropolitan cypress owes its reputation for straight pieces with long fibre, accurate smooth pleasing finish and long service life. Every sash bar, rafter, ridge bar, etc., that leaves the Metropolitan plant is therefore of good solid wood of dense even fibre—the best greenhouse quality that money can buy and unhesitatingly guaranteed as such.



This picture shows a cypress tree of the genuine Gulf Red Tidewater Cypress kind, the wood of which is used exclusively by Metropolitan for greenhouse work.

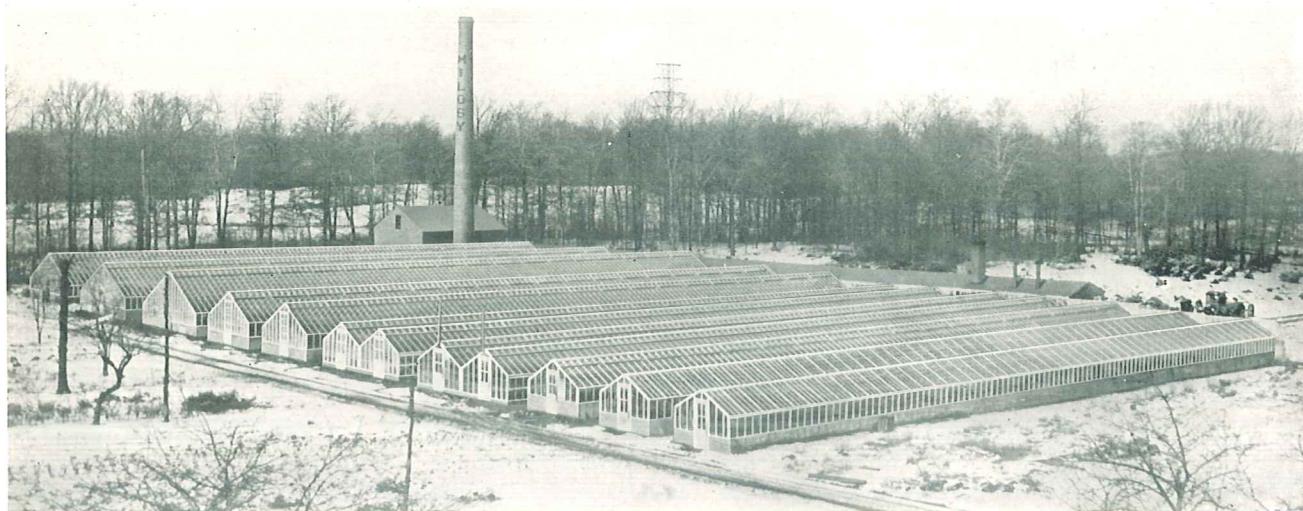
There is a cypress tree growing in Oaxaca, Mexico, in a church yard which is estimated to be more than 8000 years old and is thought by some authorities to be the oldest living thing in the world.



Metropolitan 17-ft. 6-in. x 75-ft. Semi-iron-frame Greenhouse erected complete including heating and workroom at Overlook Farm, Port Chester, N. Y.



## Stephen Milosy has built 40 Metropolitan



50,000 square feet of glass—all Metropolitan Greenhouses

STEPHEN MILOSY of Plainfield, N. J., has a reputation of doing things in a big way. At orchid exhibitions, he has taken gold and silver medals and other awards against all comers. He claims his gardenias, orchids, euphorbias, etc., are in such demand in the New York market that he can't supply enough.

Mr. Milosy has always been a go-getter, ready to meet any competition, believes big opportunities await every grower who produces on a quality basis, and he backs his words with plenty of action. Mr. Milosy advises growers to produce only strictly high-quality stuff, build enough first-class greenhouses so that there will be no crowding, and grow the plants far enough apart.

Mr. Milosy has selected Metropolitan Greenhouses exclusively—40 of them built progressively during 20 years—and says he wants none of any other make. As Superintendent for over 17 years for George Schlegel of Brooklyn, Mr. Milosy built there a range of twenty 22-ft. to 25-ft. Metropolitan Semi-iron-frame Greenhouses and later built Mr. Schlegel's range of 350-ft. Metropolitan Semi-iron-frame Greenhouses at Westwood, N. J.

During the three years in which Mr. Milosy has been in business for himself, he has built twelve 150-ft. Metropolitan Semi-iron-frame Greenhouses at Plainfield, N. J.

When California flowers, grown easily in the

open air and by cheap labor, began to horn in on his trade, Milosy knew that however good the quality, blooms shipped from such a distance could not be so presentable or last so well when exposed to the air. Instead of whining about bad times, he successfully combatted the far distant shipments by growing better stock and applying factory engineering and efficiency methods to cut down his production costs. How well he has succeeded may be judged from the detailed description of his plant, and from his recent statement that if business will only remain as good as it has been for the past two years, he will be happy for the rest of his life.

The Milosy Plant at Plainfield, N. J., contains many unique features which are distinct advances in the growing industry. The twelve 150-ft. Metropolitan Semi-iron-frame Greenhouses are connected at the back by an 18-ft. x 280-ft. service shed, and each is provided with fifteen 250-watt electric lights for night illumination. For sprinkling, each greenhouse has two or three lines equipped with high pressure nozzles. An ample water supply under any conditions is provided by an outside artificial lake 250 ft. long, 100 ft. wide and 12 ft. deep, and partially fed by rain water.

Heating is accomplished with a combination of hot water coils under the benches and steam coils overhead. Every greenhouse in the range is easily heated to 70 deg. on the coldest, windiest winter



## Greenhouses during the past 20 years

night, and automatic thermostatic control not only permits different temperatures to be carried independently in each greenhouse, but maintains each predetermined temperature within 2 deg. plus or minus.

The boiler rooms contain three 10-section Metropolitan Cast-iron Boilers and two 150-hp. tubular boilers, all fired by oil burners and served by a 125-ft. stack. In anticipation of expansion, the boiler rooms are large enough to house necessary boiler capacity for a plant of triple the present size. Two 5000-gal. oil storage tanks hold enough fuel to carry over long periods without replenishment of the supply.

Burning 3-cent oil with practically no firing expense, this Metropolitan Heating System gives extremely high heat where and whenever needed and at so low a cost that fuel and firing are hardly a major expense item.

In the whole plant, there is not a step even one inch high and not a pipe placed to interfere with the walks or to bump a tall man's head if he does not "duck."

Mr. Milosy says that in all his experience, he has never had any rotted material in a Metropolitan Greenhouse, or known of any other make of greenhouse with such substantial roof support. His plant gets all the wind that comes, and in some winters a few heavy snow loads, but even in the oldest Metropolitan Greenhouses he has built, the liberal roof support has maintained perfect alignment and freedom from glass breakage. The Metropolitan Greenhouses shown were once subjected to the severest hail storm known in New Jersey in 66 years. The hail stones were so plentiful that they could be shoveled, and the largest measured  $1\frac{1}{2}$  inches across the longest dimension. Other greenhouses in the neighborhood had had 50 to 75 per cent glass breakage, and Mr. Milosy thought it was goodbye for his too, but thanks to Metropolitan  $6\frac{1}{2}$ -inch pitch, strong roof support and good quality glass, *only 21 lights were broken.*

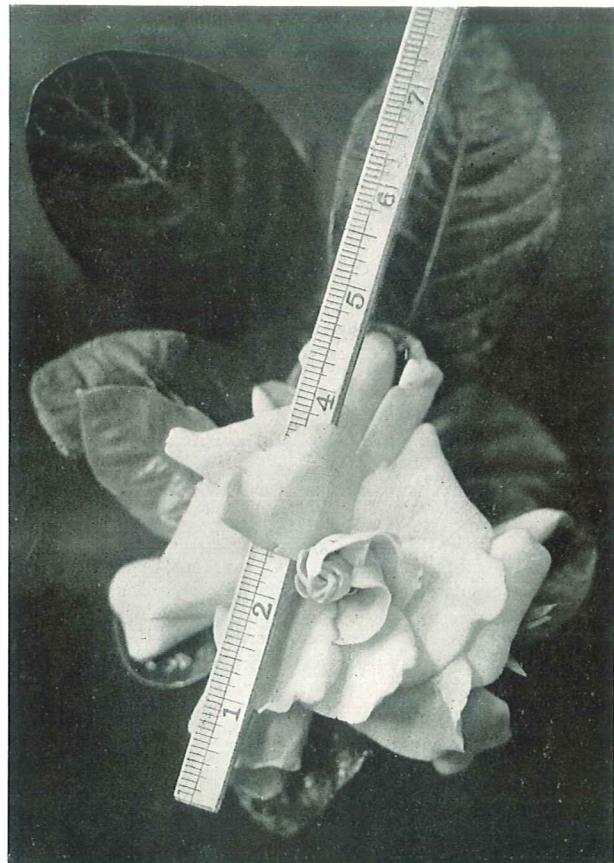
Mr. Milosy is enthusiastic about Metropolitan extra steep ( $6\frac{1}{2}$  inch) roof pitch, and the resulting thicker blanket of warm air over the growing plants. He recalls a range composed of Metropolitan Steep-pitch Greenhouses and others with ordinary pitch, and that in the latter, the sun heat

always disappeared earlier in the afternoon, and the drop required putting the boilers to work earlier than they would have been needed for the Metropolitan Greenhouses.

Mr. Milosy says also that although Metropolitan design and materials appeal to him as easily the best, Metropolitan has always quoted him prices lower than he could get elsewhere for less desirable design and material.

Metropolitan houses have a reputation for strength, stiffness, thorough ventilation, maximum penetration of daylight, economical heating and long life.

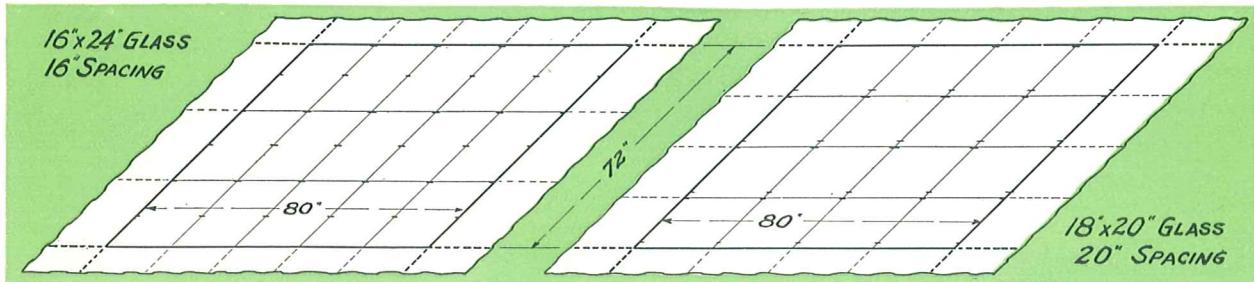
One of the Metropolitan officials will advise you without charge as to what kind and size of greenhouse you should select and will be glad to put you in touch with owners of similar houses.



Gardenias nearly 5 inches across—typical of many other prize-winning crops grown exclusively in Metropolitan Greenhouses by Mr. Milosy.



## Why we recommend 16-in. spacing and 16-in. x 24-in. glass as safest for greenhouse roofs



16-in. x 24-in. glass spaced 16 in. requires 15 lights, 15 laps, 5 bars and 90 glazing points.

18-in. x 20-in. glass spaced 20 in. requires 16 lights, 16 laps, 4 bars and 64 glazing points.

FIG. 1. Comparison of both arrangements over equal roof area 80 in. wide x 72 in. high. Standard (16-in. x 24-in. glass spaced 16 in.) has one light and one lap less, one bar more and 40 per cent more glazing points. After all, sash bar support and well tacked glass make the strongest, tightest roof. Points in the middle do not crack flat drawn glass.

ALTHOUGH 16-in. spacing and 16-in. x 24-in. glass are the approved regular practice of almost all greenhouse builders, the question of 20-in. spacing with 18-in. x 20-in. glass is sometimes raised, and the service conditions may be such that the wider spacing and glass may be practical.

We recommend the time-tried satisfactory and generally accepted standard of 16-in. spacing with 16-in. x 24-in. glass, but will build or furnish material either way and at consistent price. Where the buyer makes the choice and assumes the responsibility, we are, of course, as willing to furnish the one construction as the other, but we deem it only fair to the prospective owner to acquaint him with the following facts about both, in order that he may be better able to make his selection.

Good greenhouse roof design and construction must provide adequate strength and freedom from glass breakage and cracking as first essentials. By this is meant the strength to come through any storm wind pressure and snow load without damage.

Kent's Mechanical Engineer's Pocket-book says, under Pressures of Wind Registered in Storms:

"The highest pressure of wind recorded at the Greenwich Observatory is 41 lb. per sq. ft. . . . The

New England Coast is exposed to storms which produce a pressure of 50 lb. per sq. ft."

Marks Mechanical Engineers' Handbook says:

"In ordinary calculations, 100 miles per hour is used as the maximum velocity of the wind. This is equivalent to 50-lb. pressure per sq. ft. on a flat surface. . . . Where snow is likely to occur, the minimum load should be 25 lb. per horizontal sq. ft. of roof for slopes up to 20 deg., and 1 lb. less for each additional degree up to 45 deg. (On a greenhouse roof, this corresponds to a maximum snow load, exclusive of wind pressure of 15 lb. per sq. ft.) . . . No roof or any part thereof should be designed for a total live (wind) and dead (snow) load of less than 40 lb. per sq. ft."

If a severe storm occurs while a heavy blanket of snow covers a greenhouse roof, the weight of the snow must be added to the wind pressure, so in saying that a greenhouse roof should be built to stand at least 40 lb. per sq. ft., we are very conservative.

What effect has this 40-lb. load on glass spaced 16 in. and 20 in., respectively, between sash bar supports? The answer is indicated in Fig. 2. Experience has proven to us that in regions subject to heavy wind storms or snows, this 25 per cent greater load between

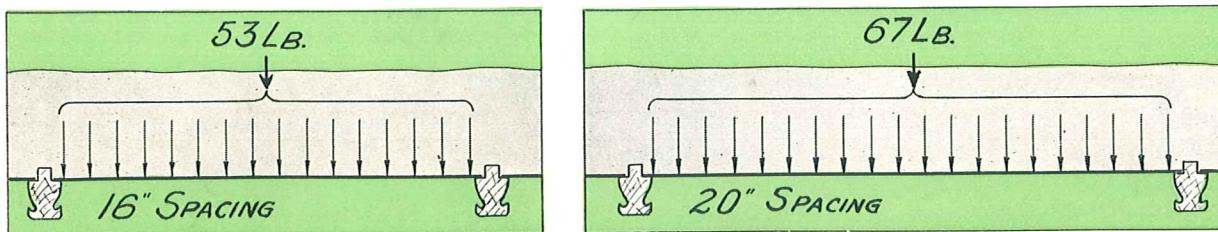


FIG. 2. What snow and wind load do to 16-in. and 20-in. spacing.

16-in. spacing reduces maximum load to only 53 lb. per horizontal foot width of roof between sash bars.

20-in. spacing compels the glass to support 67-lb. maximum load between sash bars per horizontal foot width of roof.



sash bars where glass is wider (20-in.) is too much. Glass is slightly flexible but brittle. It will take a lighter load, bend and come back, but, like the last straw on the camel's back, the excess load is a prolific cause of cracking. We believe in imposing this excess load on wood sash bars and not on the glass. The sash bars will take it without harm.

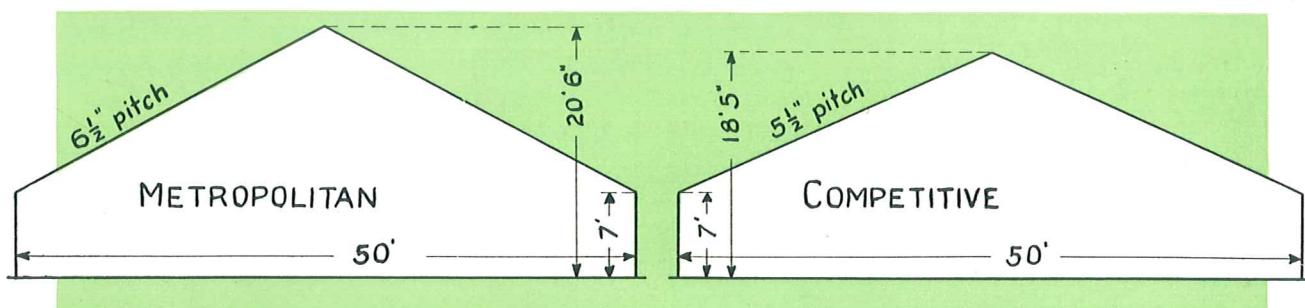
It is true that 20-in. spacing requires only four sash bars to five with 16-in. spacing, and lets in a very little more light, but *only at the sacrifice of roof strength*. Whether more wood and less glass or less wood and more glass should support the roof load depends upon storm and snow load conditions in the vicinity in each individual case. Where heavy storms and snows are absent, 20-in. spacing may be justified.

The other considerations are secondary but should not be overlooked. Some claim that 18-in. x 20-in. glass is easier to handle. It can be set with four nails per light, although good practice demands six with 16-in. x 24-in. glass, but the four nails must be larger and are more apt to split the sash bars. Those at the bottom end of the light are also under the heavier

pressure and therefore work loose easier and are more apt to permit penetration of moisture into the sash bar, after the putty has cracked. Four heavy nails also concentrate greater holding pressure on fewer spots, while six give an ample fastening with lighter spot pressure at the contact points. This means that with too tight binding from careless setting of the glazing points and the necessarily greater glass movement from the excess pressure with wider (20-in.) sash bar spacing, 20-in. glass is far more apt to crack than is 16-in. glass.

This problem of glass spacing is only one of dozens that the greenhouse designer must meet, and the analysis given herein is typical of the way in which Metropolitan Engineers go into every detail. It has been a steadfast Metropolitan policy, *first*, to adopt as standard only those construction principles which have proven best for long greenhouse life and satisfactory service, and, *second*, where several constructions are optional, with difference in cost and efficiency, to give the customer an honest presentation of the facts, together with recommendations based upon giving the greatest value per dollar invested.

## Metropolitan Houses are built with 6½-inch roof pitch



**C**HECK up your greenhouses of any make but Metropolitan and you will probably find the roof pitch to be 6, 5½ or even 5 in. to the foot. The Metropolitan standard is 6½ in., giving a 28½-deg. slope.

By following the competitive practice of lower pitch, we could use shorter, cheaper rafters and less glass to produce a house of the same width, or with the same rafters and glass, we could build a wider house. But—the lower house for less money or the wider one at the cost of the Metropolitan standard, would be a poor purchase in comparison.

Here are the reasons. It takes no genius to understand them:

Rain water *leaks through* at low pitch, but runs off with our steeper pitch.

Slanting winter sun rays that glance or reflect off a low roof *penetrate* a high one, and put more light and heat into the houses when most needed and when crops bring the biggest prices.

The 6½-in. pitch or 28½-deg. slope of a Metropolitan Greenhouse is just over the critical angle at which snow and slush slide off the roof surface quicker and easier. This, in connection with the Metropolitan Patented Cast-iron Eave Plate keeps the eave free and clear, ditches the slush, takes the weight off the glass and brings back the normal light quicker. In any group of snow and ice-bound houses, those of Metropolitan build are always the first to clear up.

The steeper the pitch, the thicker the blanket of warm, still air over the growing stock. At the center of a 50-ft. Metropolitan House, for example, this air blanket is almost two feet thicker than in an ordinary house. Inasmuch as cold penetrates still air slowly, the plants are kept warmer and steady growth is stimulated in cold weather, while at the glass more heat is available to melt and dispose of snow.

Metropolitan is the only construction firm to retain the 6½-in. roof pitch (28½-deg. slope) that gives growers the above advantages.



## Sound reasons for rafter spacing no wider than 6-light

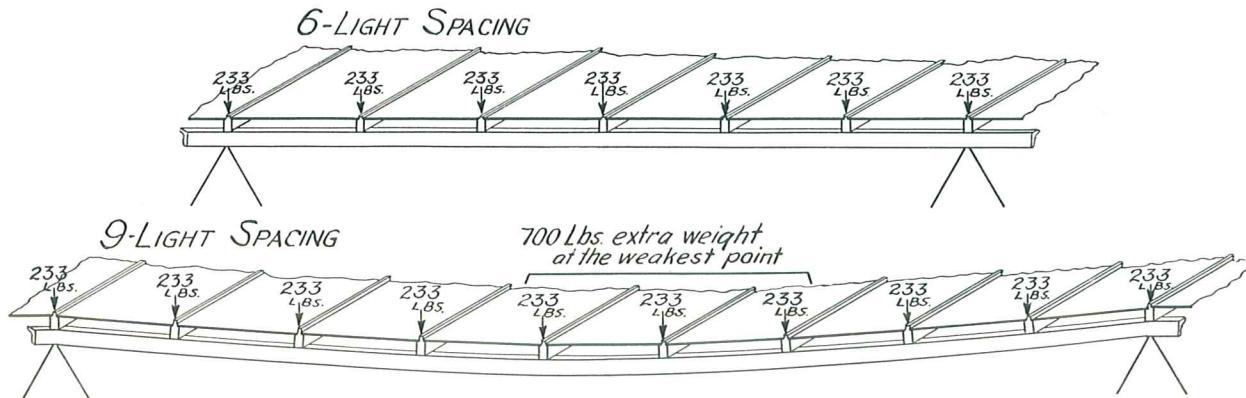
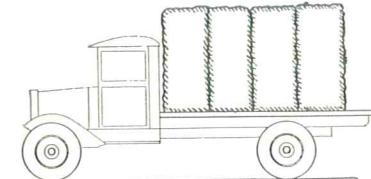
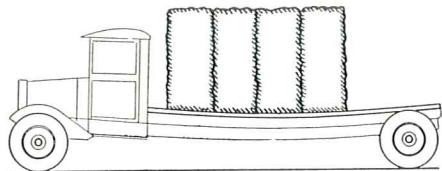


Fig. 3



Correct Weight Distribution

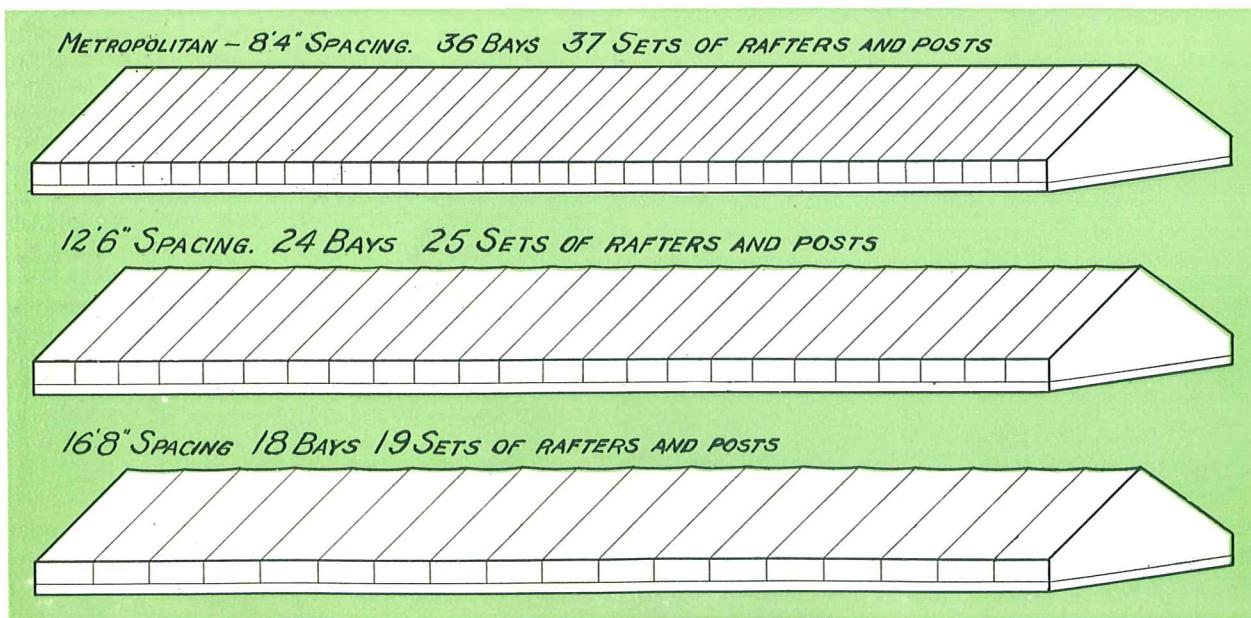


What would happen with 50% longer wheel base

TRUCK manufacturers avoid sag and strain of the truck body by designing the ground support well under the load.

Because of possible snow load or wind pressure the rafter spacing of a greenhouse should be figured the same way. To be safe it must be figured that snow or wind may sometime impose a load of 40 lb. per sq. ft. As the roof bars and glass weigh about 3 lb. per sq. ft., the rafters and columns must be able to support 43 lb. per sq. ft. of roof.

As purlins are ordinarily located 4 ft. apart up the roof, each purlin section between supports holds up 33 sq. ft. of roof with 6-light (8 ft. 4 in.) spacing or 50 sq. ft. with 9-light (12 ft. 6 in.) spacing. The possible load on each purlin in





a storm or under load is therefore 1400 lb. with 6-light and 2100 lb. with 9-light spacing. In either case, the corresponding load on each sash bar at the purlin is 233 lb.

The diagram (Fig. 3) shows you that 9-light spacing must be able to support 700 lb. more than 6-light and that the extra load comes *at the center*, which is the weakest part.

Even under the light load of the roof itself, 9-light spacing is weak, and could not be made strong with purlins of reasonable size. If you doubt this, go into any house built that way, take hold of a purlin midway between supports, pull downward and it will spring under much less than your own weight. You can imagine the sag under snow load and the vibration and heaving in a wind storm! The extent to which these things do happen is proven by the excessive breakage of glass in houses with wide rafter spacing.

Go into a Metropolitan 6-light-spaced Greenhouse and make the same pulling test. You will find the purlin and roof resist sag and stay rigid. Not only is this extra strength assured by the narrower spacing, but at extra cost to ourselves we have additional carbon put into our purlin steel in the making. The higher percentage of carbon makes Metropolitan purlins decidedly stronger in the metal itself and better able to support any load.

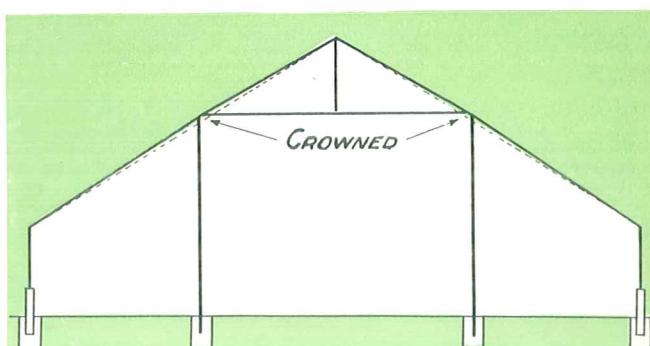
## Positive roof support which absolutely prevents sagging

**I**N greenhouses over 25 ft. wide, Metropolitan uses good substantial columns spaced 8 ft. 4 in. apart and set in concrete base, as essential roof support. To further prevent sag, the rafters of Metropolitan Iron-frame Greenhouses are slightly crowned (see diagram) directly over the column tops. The heaviest wind pressure or snow load will not budge this rock-solid construction. As the greenhouse gets older, the roof alignment stays perfect, no glass breaks, and the puttyed joints stay tight, keeping the moisture out.

Hang onto the rafter of a Metropolitan Iron-frame House and *there will be no spring*, and if you sight up the roof from the outside, you will never find a sag, even in houses long in service.

Metropolitan Greenhouses have this same incomparable strength and stiffness at every point, as the design throughout is the best that good engineering can provide.

While we only build truss construction in Metropolitan Greenhouses to a limited extent, we will build trusses in greenhouses of any size if the customer desires this type of construction.



"All materials for our two Metropolitan Greenhouses built in 1925 and 1928 are satisfactory and quality considered prices were less than from other companies. Deliveries were prompt, and if we build again we would again buy from Metropolitan."—Fisher & Masson, Dahlia Specialists, Trenton, N. J.



A typical Metropolitan Greenhouse. Roof alignment as good after 10 years as when new.

"We have two Metropolitan Greenhouses and believe they are the best on the market."—Gerard Reetveld, Bellmore, N. Y.



## Metropolitan Curved-eave Iron-frame Greenhouses

FOR private estates, public grounds, parks and for commercial showhouses or sales conservatories in connection with stores, this type of greenhouse, requiring no eave plate, is the last word for fine appearance combining strength and beauty without sacrificing utility.

A very wide variety of flowering plants and vegetables can be grown even in a single house, by partitioning it into several compartments and installing different amounts of heating surface and independent ventilation in each. In this manner different temperature, moisture and ventilating conditions can be maintained to the best advantage of stock grown.

Pipe-frame benches with cypress bottoms and dressed cypress sides or pipe-frame benches with tile bottoms and wood or slate sides are used. Where the finest bench is desired, slate bottoms

and fitted slate sides should be used. (See Page 67.)

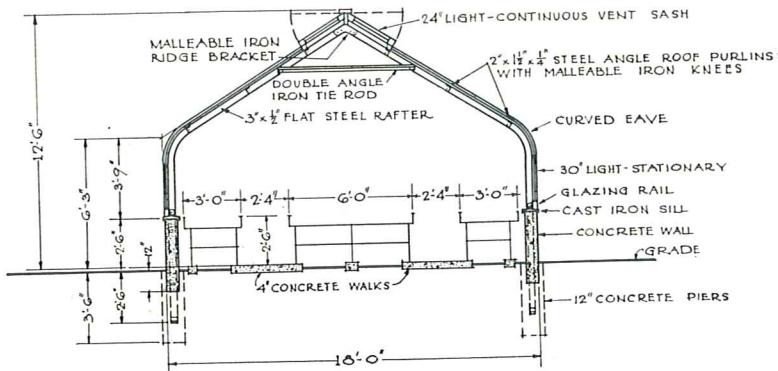
The roof frame consists of liberally-spaced flat steel rafters and angle iron purlins and in houses of 25 ft. and greater width, the rafters are supported by two rows of columns spaced to share the weight properly.

A cast-iron sill is used to cap the entire top of the masonry wall forming a neat and substantial finish.

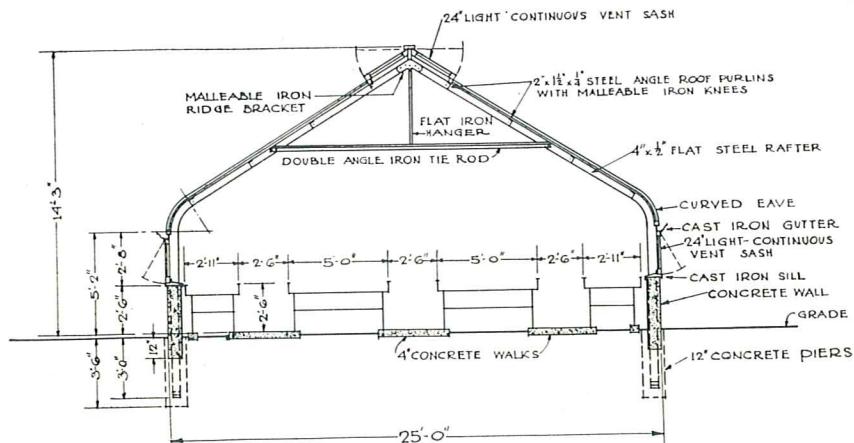
If side ventilation is desired, a cast-iron gutter is furnished below the curve and ventilating sash hinged to this gutter.

With the exception of the detail at the curved eave with its attractive, shadeless and dripless feature, this construction is very similar to the iron-frame houses shown and described on Pages 27 to 46.

No. 1561—A very convenient greenhouse that can be built in lengths around 50 ft., with four benches or with a wide center bench, as shown, for potted plants, substituted for the two narrower ones. An excellent greenhouse for supplying flowers, plants and vegetables on a fairly large private estate.



No. 1562—The widest greenhouse we recommend with 4-bench arrangement. Lengths about 100 ft.





## Metropolitan Iron-frame Greenhouses

Low-eave type in widths from 8 ft. 0 in. to 49 ft. 3 in.

High-eave type from 28 ft. 7 in. to 68 ft.

THESE are the strongest and most durable greenhouses that can be built. Every detail is worked out for neatness, high degree of light transmission and for greatest resistance to all destructive influences to which greenhouses are subjected. Where comparative freedom from maintenance attention and expense over a long period of time is a first essential, as with the high-grade commercial grower, these greenhouses will yield the highest return on the investment. On a private estate or in a public park, they will add tone to their surroundings and preserve their good appearance with least attention from the supervisor.

Low and high-eave types have the essential advantages of the curved-eave type, but avoid the added expense of the curved-eave where appearance does not demand this refinement. The walls may be of concrete, tile, sheet asbestos or wood.

The low-eave type in widths up to 21 ft. 8 in. is much used on private estates and for propagating and connecting larger houses. For the latter service, the ends must be fitted on the job. Widths of 21 ft. 8 in. and greater are highly recommended for commercial places.

The high-eave type is the preferred construction for all-around adaptability. In our estimation the 39-ft., 42-ft. 4-in., 49-ft. 3-in., 60-ft. and 68-ft. widths with either tile or wood walls are the preferred ones for growing cut flowers.

Iron-frame greenhouses sold by us and erected by the owner are easier and cheaper to put together than any other kind and in this way partly repay the extra initial investment for their higher priced material.

**Posts**—The posts are made from refined wrought-iron rectangular bars, which are universally conceded to outlast steel in the presence of moisture. These posts extend in one solid piece from the eave down into the concrete walls and piers into which they are embedded for absolute rigidity.

They are spaced 8 ft. 4 $\frac{1}{8}$  in. apart and are drilled for all bolts to hold eave brackets and ventilating hangers and for knees for galvanized steel

transom and main sill and footboard where these are used.

We do not economize on roof supports by setting posts and rafters 12 ft. or 16 ft. apart, and then try to make up the strength by a little heavier purlin. With our post and rafters all spaced less than 9 ft., there is no sagging of purlins or swaying of roofs to crack and break the glass. Glass

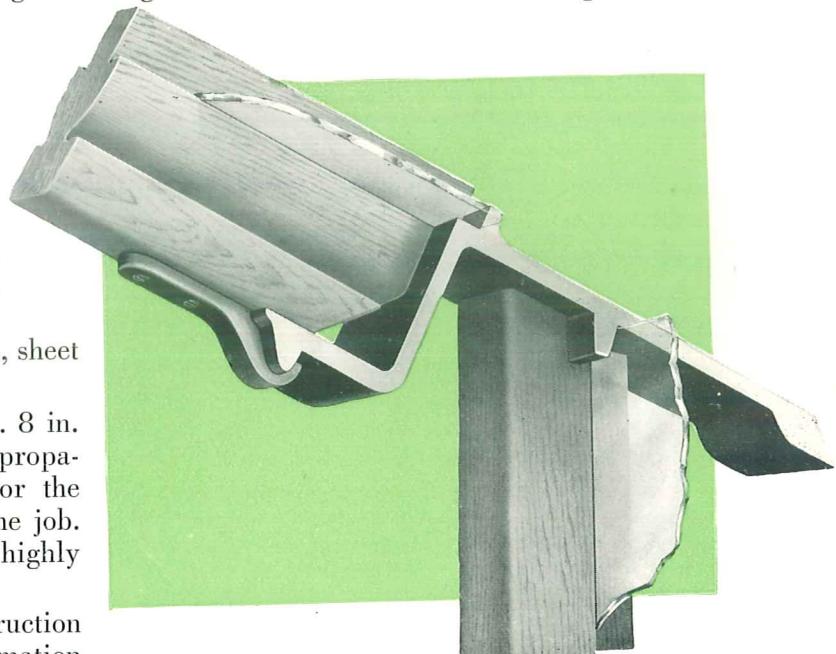


FIG. 4—Typical eave assembly in a low-eave type Metropolitan Greenhouse with Metropolitan Patented Cast-iron Eave and Gutter Plate.

in a Metropolitan Greenhouse never cracks or breaks from any wind pressure or snow load, a feature of which you cannot be sure with wide post spacing or weak purlins.

**Purlins**—The purlins are made of .15 to .25 per cent carbon steel angles and are so hard and stiff that they *must* remain straight. The angles, in size 2 in. x 1 $\frac{1}{2}$  in. x 1 $\frac{1}{4}$  in., are fitted between and securely bolted to the rafters with certified malleable-iron purlin knees with bolt and non-slipping boss.

There is no sagging as with ordinary soft steel angles, which are ordinarily used by other greenhouse builders.

**Rafters**—Made of absolutely straight .15 to .25 per cent carbon structural steel which gives

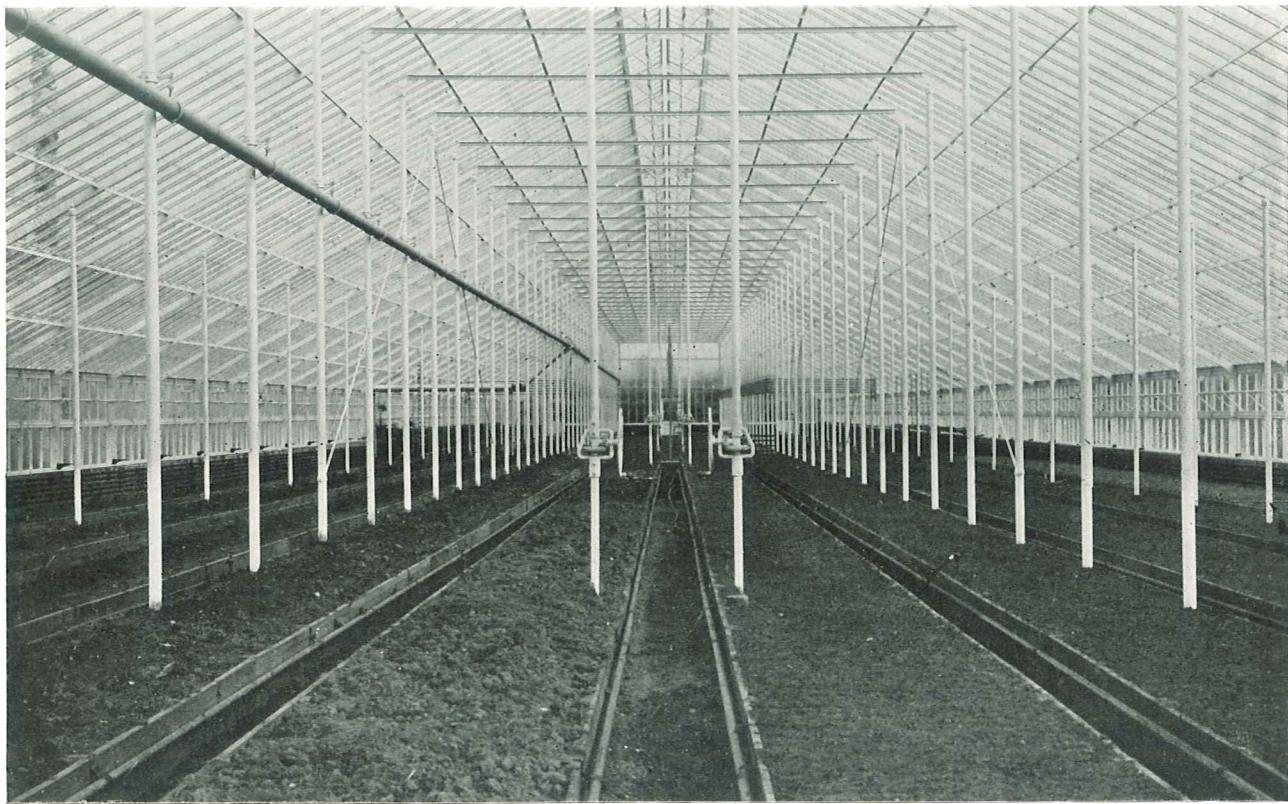


super-strength when required. When subjected to a heavy snow or wind load, this steel stays rigid and has the snap and life to preserve good alignment under any condition.

The rafters are fastened to the posts by certified malleable-iron brackets with galvanized bolts, and are held together at the ridge by similar bolted brackets on top of which the ridge rests in a fitted seat. In order to keep the roof from sagging with consequent side thrust on columns, posts and side wall, the rafters are reinforced under the ridge by horizontal double angle-iron tie rods. In houses of 25 ft. 1 in. and greater width, where these horizontal rods are of considerable length, they are kept from sagging at the center by tying with king ties bolted to ridge bracket.

**Rafter spacing**—The rafter spacing in all Metropolitan Iron-frame Greenhouses is 8 ft. 4 $\frac{1}{8}$  in., with six intervening rows of lights. Gable walls are equally well strengthened. In connection with standard Metropolitan column and purlin construction, this rafter spacing gives a solid purlin support which prevents vibration in severe storms and sag under excessive snow loads, keeping the glass joints tight at all times without any cracking of the lights.

In comparison with the competitive practice of using much wider spacing in wide houses, the greater number of rafters and posts costs us more, but we do not believe in stinting at the risk of adding greatly to maintenance troubles and expense. The fallacy of spacing rafters farther apart to have fewer posts will be seen from examination of older houses with this construction,



**B**UILT in November and December—almost the worst time of the year—and erected in six weeks to permit a spring crop. This 60-ft. x 350-ft. Metropolitan Iron-frame Greenhouse, high-eave type, with service house and modern heating system was erected for Fred Klug, Blue Point, L. I. One-half has 10 longitudinal solid beds, and the other half has crosswise beds for growing sweet peas.

Heating at the near end in the interior view comes from an overhead main and coils at the side walls and bench sides.

At the far end where the sweet peas are grown, the heating coils are placed at the side walls and overhead to avoid interference with the plants.

Mr. Klug says:

"I'll give Metropolitan as high a recommendation as they can get from anybody. Their word is as good as their bond. They built my 60-ft. x 350-ft. greenhouse in record time and their mechanics and materials are first class. The heating boiler is the best ever."



where the excessive deflection under snow load and the cracking of glass are often painfully evident. A confession of this weakness is found in the intermediate strengthening posts in side walls, the intermediate supports at the ridge, and the network of crossed tie rods often used for rigidity under the roof. All this material and its fabrication costs outweigh any saving in main posts and columns. Further, tie rods, in addition to being unsightly, expand and contract so much under temperature change that they cannot remain in correct tension from one winter week's end to the next.

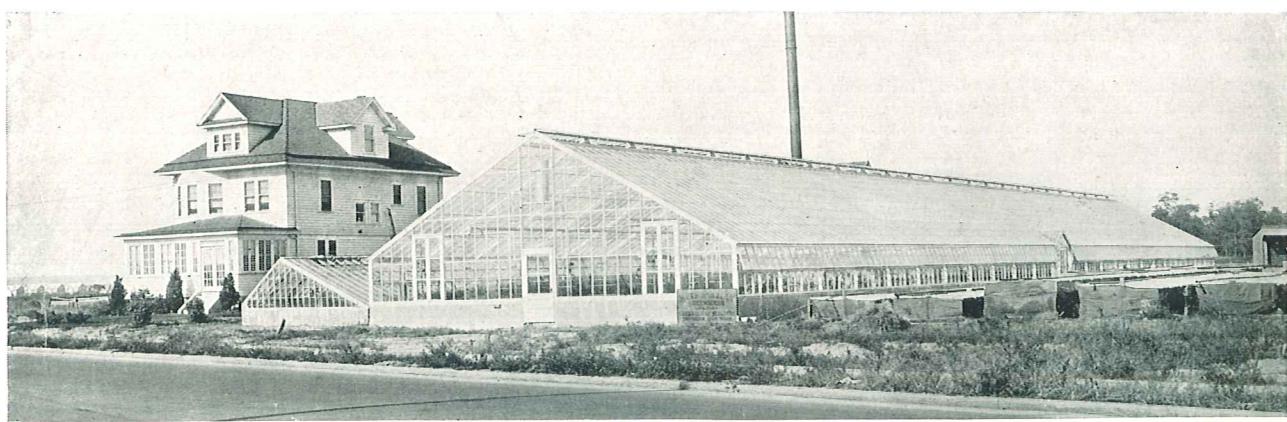
**Columns**—Rigid roof support and reduction of roof load on the posts and side wall of houses of 25 ft. 1 in. and greater width is provided by wrought-steel pipe columns attached to the rafters at such intermediate positions that the roof load is about equally distributed over every post and column. Two rows of columns accomplish this in houses up to 52 ft. 9 in. in width, and in houses of greater width either trusses or four rows of columns are used.

These columns are securely bolted to the rafters by malleable-iron caps which keep moisture from getting inside the column. At the bottom the columns are set and bolted into cast-iron bases which rest upon concrete piers, the tops of which are 1 ft. below grade.

**All frame joints made with malleable iron fittings**—It should be noted that ridge brackets, column top fastenings, post brackets and also such minor fittings as the knees for sills, transom sills, base boards, etc., are all of malleable iron, non-rusting, rounded to pleasing contour at the edges and small enough to cast little shade. Not a single sheared gusset plate is used, as rust quickly attacks the exposed metal where the original mill surface is sheared away, and we also are not enthusiastic about the rough sharp edges on such plates.

**Wooden superstructure**—The ridge bar is a moulded section with cap that takes the ventilator hinges and keeps rain out of the crack above the sash top rail. The roof bars are  $1\frac{1}{8}$  in. x  $1\frac{13}{16}$  in. with moulded drip groove (if over 20 ft. in length are spliced), and are secured to the purlins with galvanized screws. The vent headers are continuous, and vent rests between ridge and headers at the ends of sash runs have a slight gutter effect on their tops to carry away rain water from between the adjoining sash stiles without this water getting inside the house.

The ridge ventilating sash, in a single row in narrow houses, and double row in 18 ft. 2 in. and wider houses are in continuous runs and made for 24-in. light glass. Side ventilating sash in low-eave type houses are continuous and are built to



#### Bought because of satisfaction from four other Metropolitan Greenhouses

BERNHARD G. MOHLENHOFF, St. Albans, L. I., chose this 42-ft. 4-in. x 200-ft. Metropolitan Iron-frame High-eave Greenhouse on the recommendation of his brother-in-law, who had already built four Metropolitan Greenhouses and knew their worth. Mr. Mohlenhoff now agrees that in asking him to own a Metropolitan Greenhouse, the brother-in-law used good judgment.

Heat is supplied by 2-in. pipe coils, located under the benches, and fed from two overhead mains running from a Metropolitan Tubular Boiler to the far end. Side door and extra large heating mains provide for connecting to a future additional greenhouse with least expense.

METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N.Y.



**R**EINHOLD UNDRITZ Co., Staten Island Plant Nursery, West New Brighton, N. Y., bought a first Metropolitan Greenhouse about 35 years ago and has bought only Metropolitan Greenhouses since.

In addition to the handsome 24-ft. x 17-ft. Metropolitan Curved-eave Iron-frame Show House in the present plant, there are 42-ft. 4-in. x 67-ft. and 32-ft. x 83-ft. Metropolitan Iron-frame Greenhouses of the very latest construction. All are solid as a rock, rigid in any wind, tight against infiltration of cold air and good for a lifetime of thoroughly satisfactory service with little upkeep expense except for occasional painting.

Two Metropolitan Boilers in the service and boiler house make the hot-water-under-pressure gravity heating system very reliable and provide ample heat without excessive fuel consumption in cold weather.

Mr. Edward Undritz says: "Our reason for these greenhouses being Metropolitan? Simply because we have dealt with Metropolitan 35 years without a complaint, although we had tried to deal with others, but were unable to do so with satisfaction to ourselves. Metropolitan cypress bars, eave, gutter, etc., could not be better, and the prices were very reasonable. Metropolitan has given us better co-operation than one could expect, and we certainly get a square deal every time."





take 30-in. light glass in order to obtain more growing height for plants if side benches are used, or to give more head-room if walks on sides are preferred instead. In high-eave type houses, both the ventilating and the stationary sash are made for 24-in. light glass. Each ventilating sash, whether used at side or ridge, has three adjustable arms operating between two hangers bolted to the rafters or posts.

**Metropolitan eave and gutter construction**—Economy—both at the start and in the after years—demands protection against weak joints, rusting of metal and rotting of sash-bar ends at the eaves. Moisture collects at the eaves and gets into cracks, and unless thoroughly drained out quickly rots wood and rusts steel.

Metropolitan was the first and is *still* the only greenhouse builder to provide its houses with good practical daylight eave construction, substantial eave strength, and real protection against the inside drip nuisance and early decay of the sash-bar ends.

This is accomplished with the Metropolitan Patented Cast-iron Eave and Gutter Plate, which is made in 8-ft. 4 $\frac{1}{8}$ -in. lengths with ends ground square and reaching from post to post. In assembling, any possible slight end openings at the posts are filled with hydraulic iron cement which makes the eave plate and posts virtually integral.

The use of this type of eave plate permits more sunlight to come in because the sash are hinged direct to the cast iron eave plate instead of using a wooden header. The eave plate is shaped with a glass bead so that no separate header is needed when stationary glass is required.

The section contour and arrangement with this plate in a low-eave type house are shown in Fig.

4. page 27. Each length of the eave plates is supported over a correspondingly shaped malleable iron bracket that fits over and is bolted to the post tops.

The ends of the roof bars are cut with a substantial flat heel that rests solidly against the eave plate, but at the bottom are beveled back to provide a wide open drip gutter which receives all condensation and drips, and is drained through a series of galvanized pipes, one of which is threaded into a tap at the center of each eave-bar length. All parts of the roof bar are therefore always high and dry above any water in the gutter, and the gutter section is so large that it never chokes and is easily washed out with a hose. The large flat roof bar heel is in full contact with the plate and in the correct plane to squarely impose the roof thrust onto the plate. This arrangement certainly holds up the weight of the roof better than any slanting heel that tends to wedge the roof bar upward off its base and strip its fastenings. Note also the clip which holds the roof bar to the plate. This clip does not wrap or pocket any part of the bar to provide a natural lodging place for moisture and for material that could choke the drip groove. Being applied with two screws it holds where a single screw often pulls out. The clip arrangement also permits the roof bar to be adjusted to exactly the right sidewise position to make the glass fit correctly. This is decidedly superior to any arrangement that requires drilling holes in the plate and fastening with screws, where the slightest misalignment of holes or the slightest variation in width of the glass makes the lights hard to place, and apt to crack afterward.

The bead against which the bottom edge of the roof glass rests *for the entire width of the light*,



**R**OMARY & SON, Glen Rock, N. J., know the advantage to be gained by having a showhouse for displaying their plants and cut flowers. The new Metropolitan Showhouse which we recently erected for them is 25 ft. wide x 33 ft. 8 in. long, with ventilation sash on the rear half of the roof and all-plate-glass side walls. Joined to this is a greenhouse of the same size in which the stock of potted plants is on display.

With this new showhouse for display and the large up-to-date greenhouses for growing cut flowers and potted plants, Romary & Son will have quite a lead on their competitors and will realize large profits for their foresight.



not only prevents this glass from slipping, but makes a simple joint that stays tight and fixed without resorting to putty and short-lived galvanized strips. The full-length contact also forms a better seal against entrance of cold air than is possible with an integral one-point glass contact or specially attached metal glass stops.

The joint between low-eave type side walls and eave are equally simple. A projecting lug underneath the plate serves both to align the side bar ends which are cut to corresponding contour, and to make the same kind of a tight butted joint for the glass as is found at the bottom edge of the roof glass. No wooden bearer obstructs the light and adds to erecting costs.

This arrangement forms easily the neatest, strongest, longest lived and most practical eave

construction ever offered, and in addition, the small amount of heat that passes into the eave plate metal in cold weather compels ice, snow and slush to leave in a hurry. Watch greenhouses having the Metropolitan Patented Eave and Gutter Plate and you will see that they are the first to clear up after snow or sleet.

**Metropolitan Channel-iron Gutter for connected greenhouses**—This consists of a structural-iron channel set over flat iron posts and made rigid with post and rafters by malleable iron bracket. The gutter sills are composed of special straight length cast-iron Z-shaped sections with ground ends that join closely over the posts, and are filled in at the joints with hydraulic iron cement. The roof joints between metal, glass and wood have the same desirable features as the Met-



ONE of two 25-ft x 150-ft. Metropolitan Iron-frame Low-eave Type Greenhouses, built for Anton Schultheis, College Point, N. Y. With acres under glass and as one of the oldest established and largest growers shipping to the New York Market, Mr. Schultheis is thoroughly experienced with all kinds of greenhouses. His comment is therefore authoritative:

"Our two Metropolitan Houses seem to be particularly well adapted to growing flowering plants as they let in a very large percentage of the light. We have noticed that plants grown in these houses always seem to develop to a

much larger size than in other houses given to the same crops. As a solid investment and for their cost, I cannot class any other house on the market with the Metropolitan.

"It is a pleasure also to boost Metropolitan Service, as I know just what it means. When the Metropolitan construction men arrive on the job, they know just what to do and they do it. At the time our Metropolitan Houses were put up, Metropolitan must have had a fine staff of glaziers, as we have not had any glass trouble in the three years these houses have been in service."



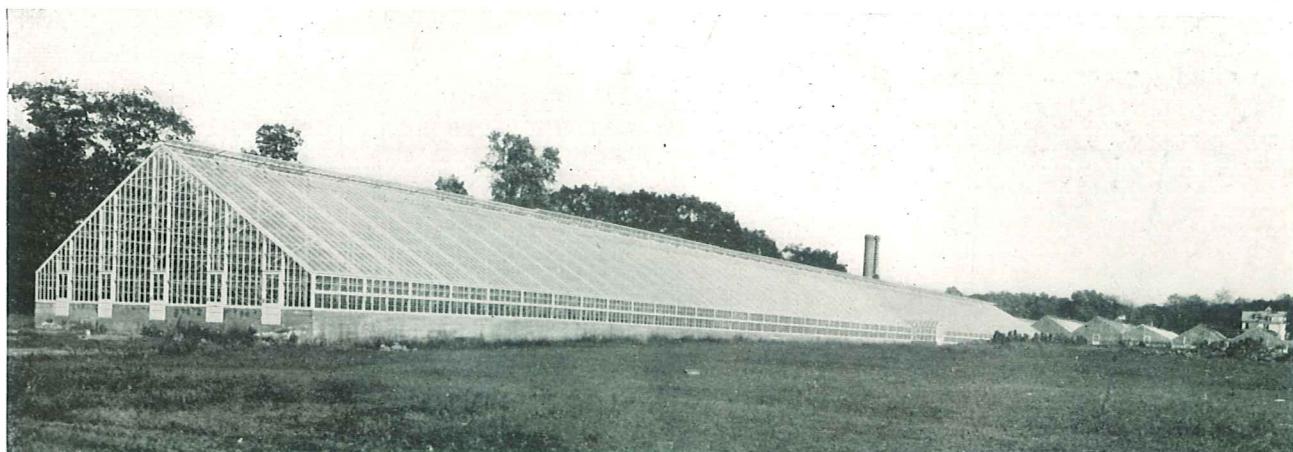
METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N.Y.

## This Metropolitan Greenhouse produces fine roses

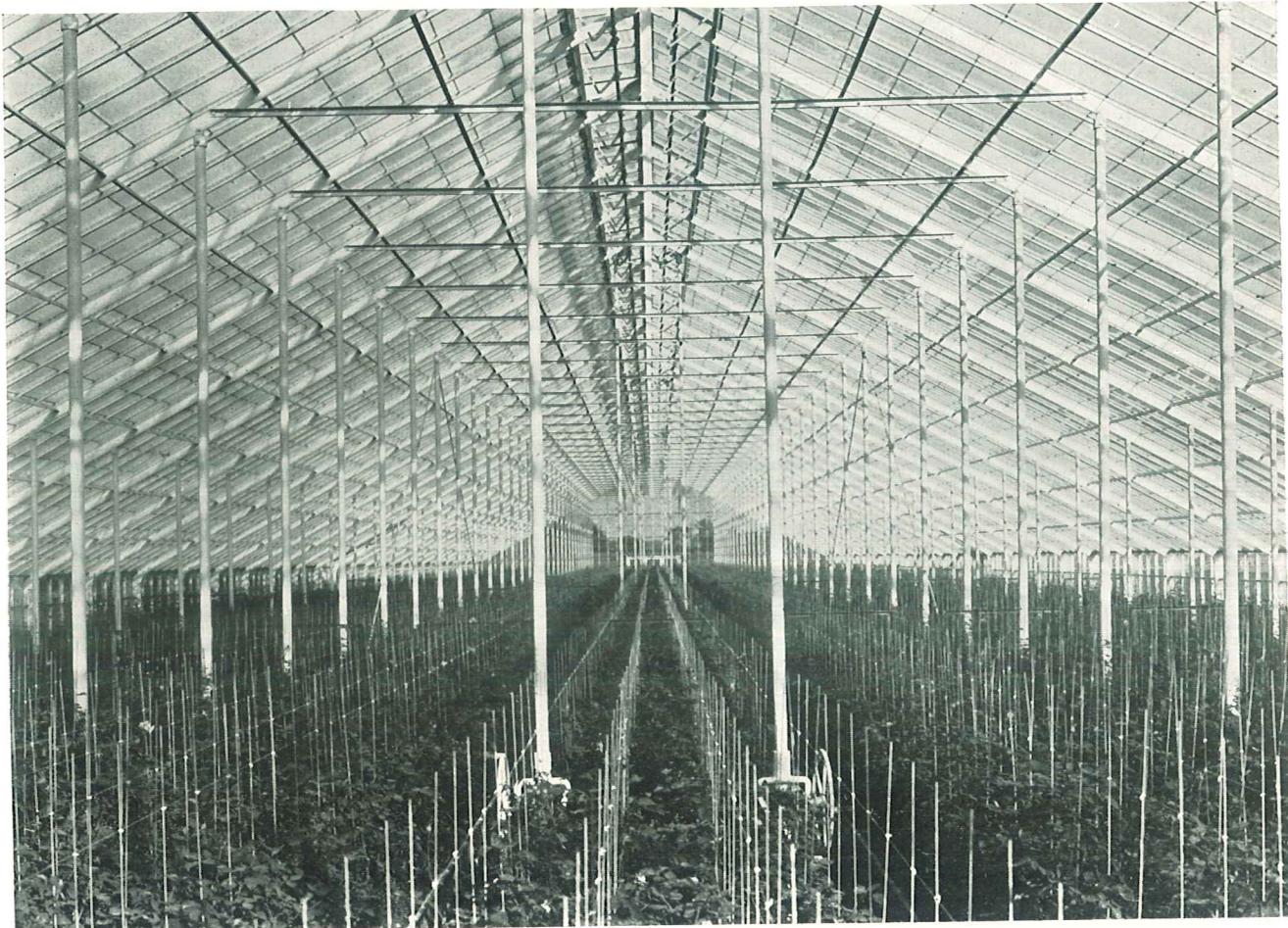


**H**ARRY O. MAY, of Summit, N. J., has specialized in roses, and produced some of the finest that ever came into New York. On the strength of satisfaction from a 57-ft. x 317-ft. Metropolitan House built for him in 1925, Mr. May in 1927 had us build what is now his largest and best house—the one

shown above. This is our 68-ft. width standard iron-frame greenhouse 509 ft. long, and is one of the finest commercial greenhouses that can be bought anywhere at any cost. Built for strength, resistance to all destructive influences, and for minimum maintenance expense, this type of greenhouse pays the best return on the investment.



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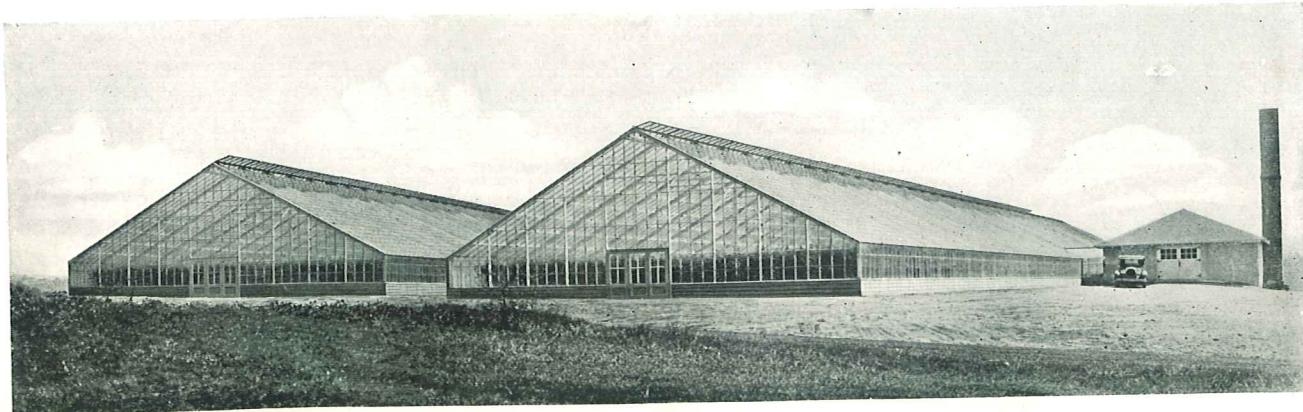
ALFRED KOTTMILLER is one of the top notchers—an old hand at the business, knows how to grow good stock, and couldn't afford to sell anything but the best from his high-class New York stores at 367 Madison Ave., in the Roosevelt Hotel, in the Ritz-Carlton Hotel and in the Vanderbilt.

Quite naturally when Mr. Kottmiller had to build, he knew what must be embodied to make good construction and where to get it. For the first house at his new Manhasset, Long Island plant, he chose the 60-ft. x 302-ft. Metropolitan Iron-frame High-eave Type Greenhouse of which the interior is shown above. The following year he doubled the capacity here by having us build

another Metropolitan Greenhouse which is an exact duplicate of the first, as shown in the exterior view. Two years later a third Metropolitan Greenhouse of the same size was built.

Now Mr. Kottmiller says:

"I have found the Metropolitan Greenhouse Mfg. Corp. very good to deal with and I like their way of building a greenhouse extremely well. The house they built for me is well put together, their material very good, their delivery prompt and charges were quite reasonable. I feel satisfied in every way and if building another house, would certainly give the contract to Metropolitan."





## Iron-frame greenhouses, low-eave

FIG. 5—Standard frame construction for Metropolitan Iron-frame Greenhouses of the low-eave type with side walls of ventilating sash on concrete wall, showing section and details at posts.

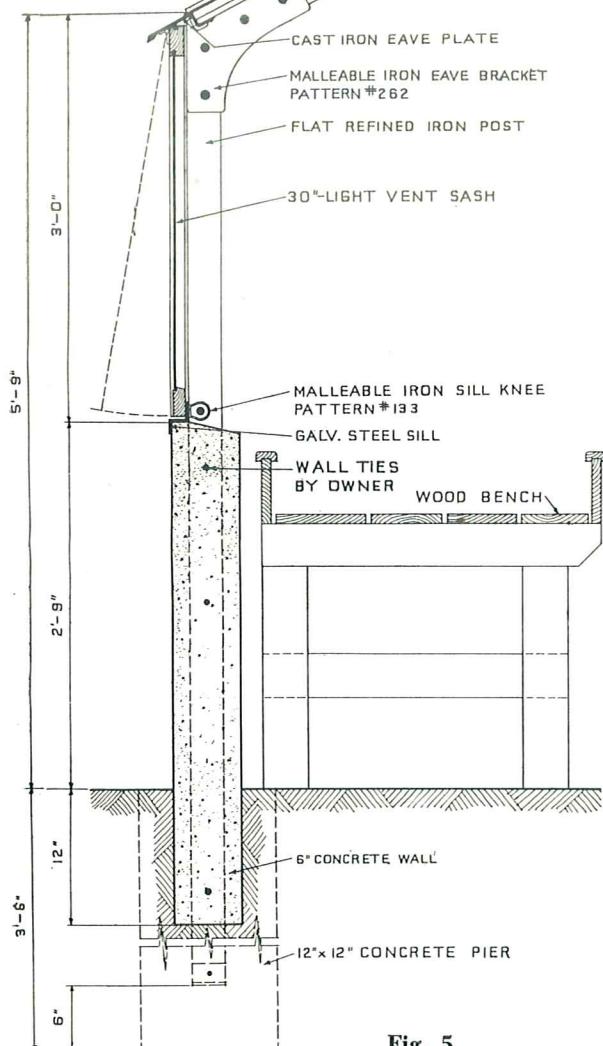
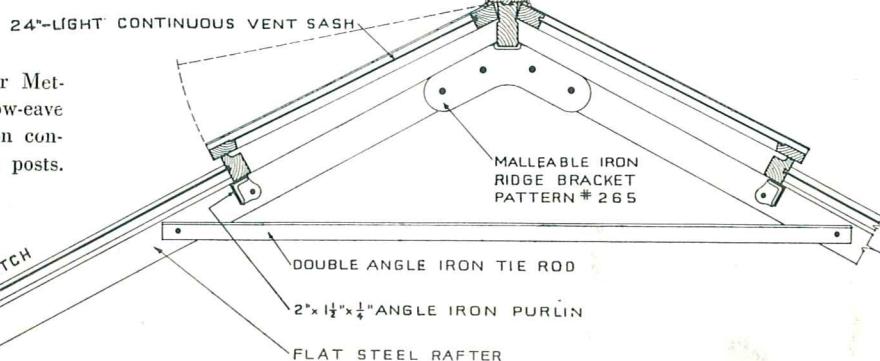


Fig. 5

opolitan Cast-iron Eave Plate just described, and the inside drip is cared for by similar drip gutters and pipe leaders. The sills are bolted to the



supporting brackets over the post tops, and the clips under the sash bars hold the bar ends to the sills tightly and with the same freedom of roof bar for perfect sidewise adjustment as found with the Metropolitan Cast-iron Eave Plate. Here again, no drilling of the sill bar is necessary for the roof bar joint and there is no pocketing of the bar end to retain moisture.

This Metropolitan Iron Gutter is strong, neat in appearance, protects structural parts from rust and rot, and throws a minimum shadow. It is used in the Metropolitan Iron-frame Greenhouse in connection with a gutter bracket that bolts to the rafter ends, and in Metropolitan Semi-iron-frame Greenhouses with a malleable bracket that clamps to the sills only to make a rigid connection.

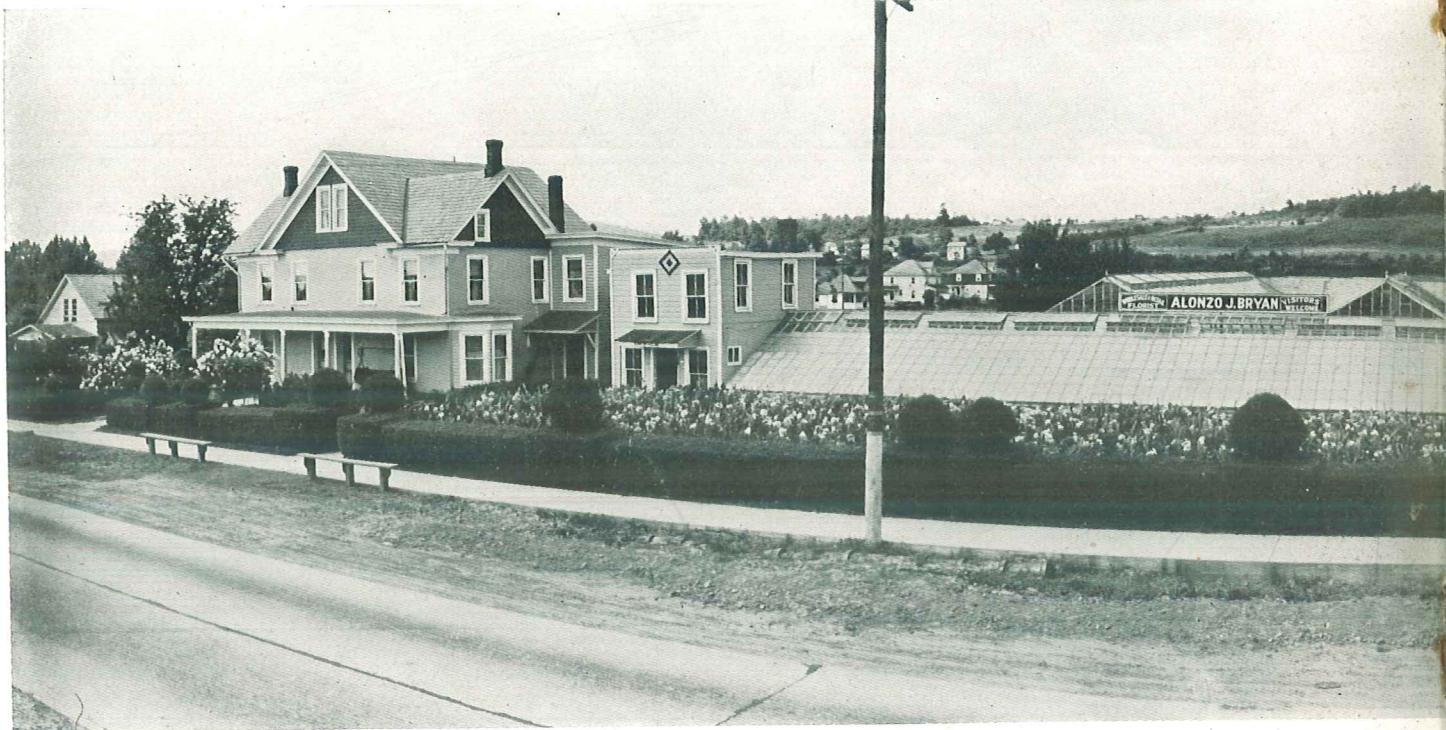
**Why Metropolitan Patented Eave and Gutter Plates and Gutter Sills are made of cast iron**—No kind of *steel* that is usable for greenhouse construction is actually rust-proof. Advocates of "Copperized Steel" admit this by calling it "rust resisting," and by galvanizing the surface. "Copperized Steel" is open to use by any manufacturer and costs little more than plain steel. We tested it thoroughly years ago, but none ever went into Metropolitan eave construction, simply because it was not good enough to fit in with other good Metropolitan features.

Cast iron, on the other hand, is proof against any weather and any exposure. The famous cast iron Pillar of Delhi out in the open in India, is known to be over 2,800 years old, but time and the elements have made no inroads to mar its beauty. Cast iron is used in Metropolitan Eave Plates for exactly the same reason that water works engineers demand it for mains that must be buried in moist ground.

METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N.Y.



## 100,000 Square Feet of Glass



Plant of Alonzo J. Bryan, Whole

—Built successively over a period of 23 years  
and paid for out of their own profits



BUILT by Mr. Bryan out of profits from his Metropolitan Greenhouses, these comfortable homes are well-built and kept.

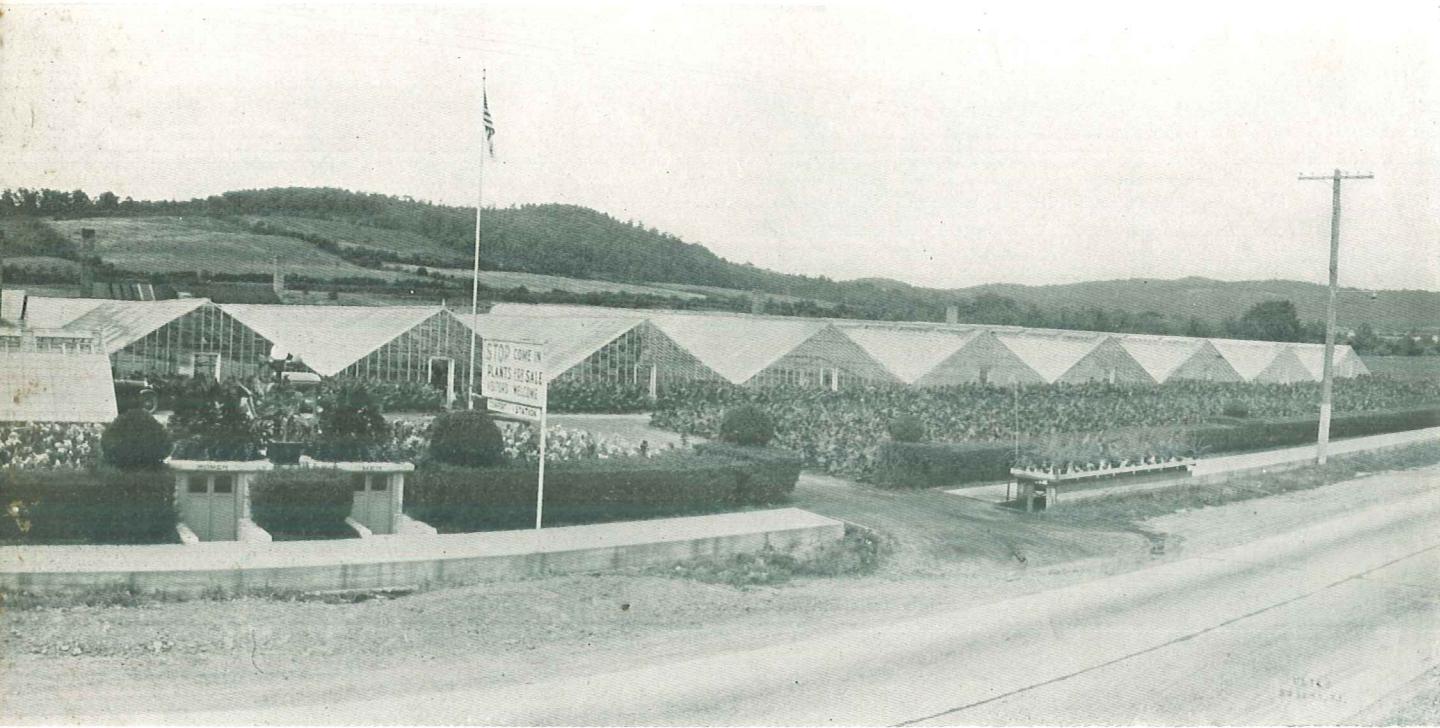
"I could write you a long story about my Metropolitan Greenhouses but haven't the time. Come here and see for yourself what a fine plant they make. Every greenhouse in the picture is of Metropolitan make, and each new addition has been built from profits made out of the older ones."

*Alonzo J. Bryan,*



METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N. Y.

## —All Metropolitan Greenhouses



sale Florist, Washington, N. J.

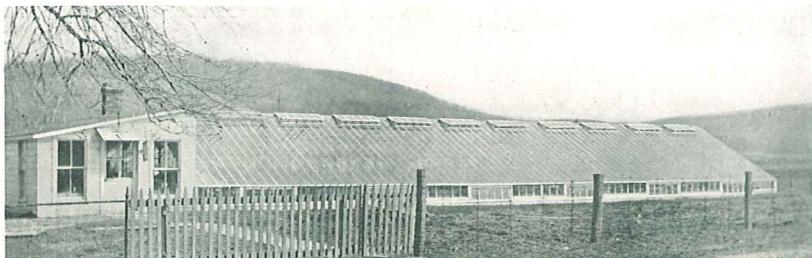
STARTING with his first Metropolitan Greenhouse in 1908, Alonzo J. Bryan, of Washington, N. J., has continued to stick to Metropolitan Greenhouses because he knows that they produce the largest quantity of the highest grade of stock with the smallest coal bill, with the least labor and material expense in keeping everything spic and span. His production can be forced to the top limit. He can quote low prices safely because he does not have to figure in a big sum for greenhouse cost.

Mr. Bryan will take a contract for future de-

livery of any flowering, decorative or vegetable plants you want, and does not balk at orders up to 100,000 of a kind. He knows that the small sum necessary for the upkeep of these Metropolitan Greenhouses will not make any real dent in his profits.

In addition to building every new Metropolitan Greenhouse out of profits taken from the older ones, Mr. Bryan has also built a substantial block of comfortable homes. All the money represented by their cost and upkeep expense also came out of the Metropolitan Greenhouses.

BEGINNING in a small way, always aggressive, and a strong believer in the square deal, Alonzo J. Bryan stands for the highest ideals in the floral business and has achieved a name for himself that anyone could envy. His success is due to his own ceaseless efforts and good judgment, the latter typically shown by his exclusive purchase of Metropolitan Greenhouses.



Mr. Bryan's first Metropolitan Greenhouse—Built in 1908 and still going strong. The present condition of this greenhouse, after 23 years, is proof that Metropolitan materials really are superior.



## Iron-frame greenhouses, high-eave

FIG. 6--Standard frame construction for Metropolitan Iron-frame Greenhouses of the high-eave type with side walls made up of ventilating and stationary sash on concrete wall, showing section and details at posts.

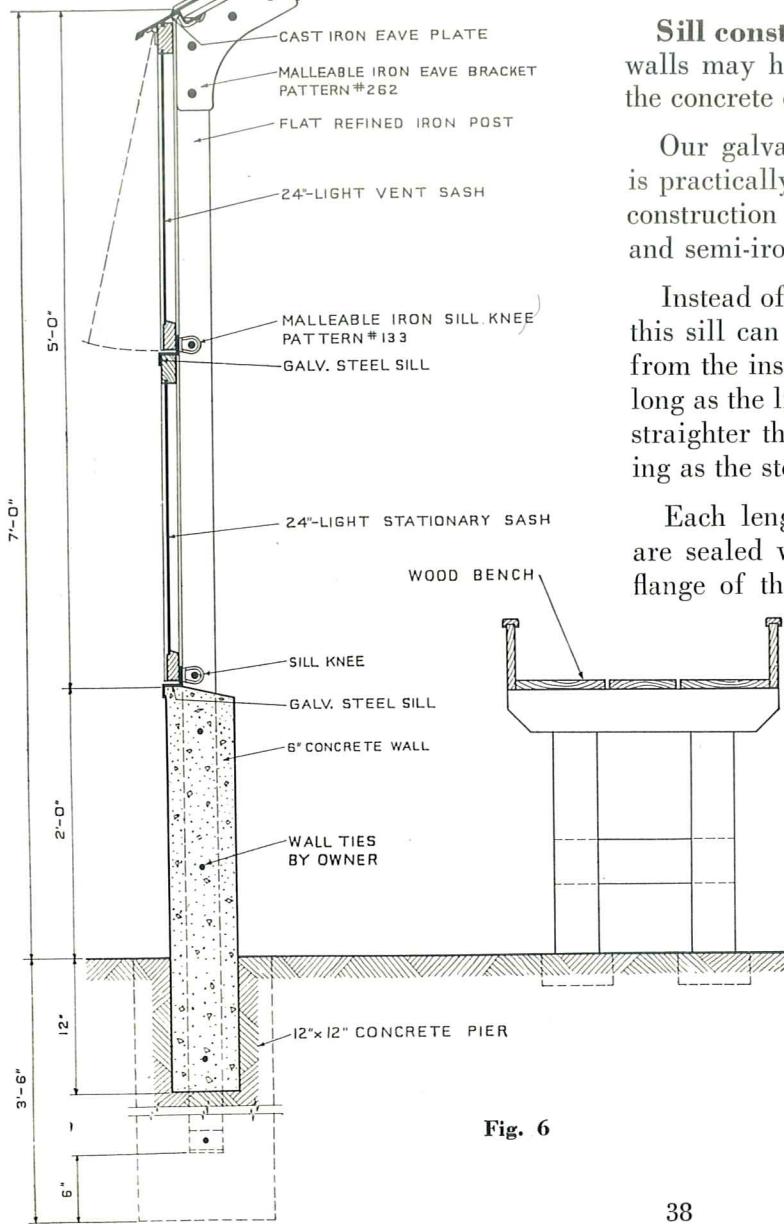
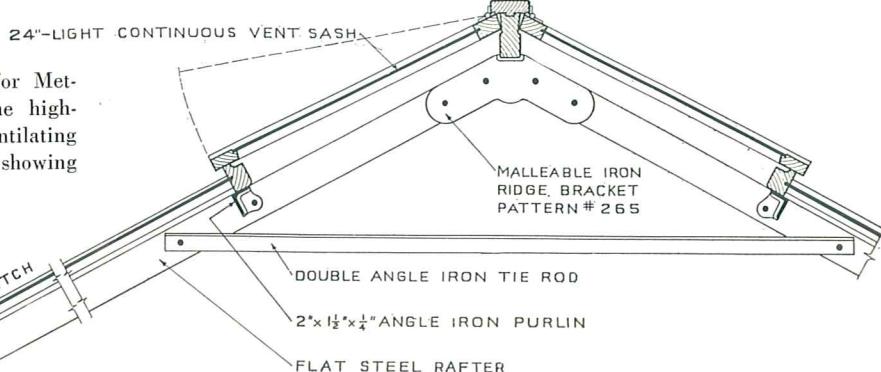


Fig. 6

**Sill construction** — Greenhouse with concrete walls may have wooden or metal sill embedded in the concrete on the top of the wall.

Our galvanized-steel sill, recommended because it is practically indestructible, is the standard side wall construction for high and low-eave type iron-frame and semi-iron-frame greenhouses.

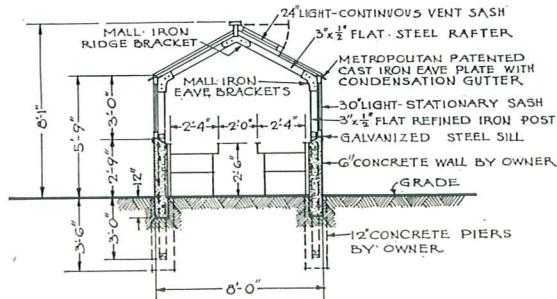
Instead of the old sill which capped the entire wall, this sill can be put in place and the concrete poured from the inside. Our galvanized-steel sill will last as long as the life of the greenhouse. The sill is not only straighter than wood but there is no chance of warping as the steel sill is strong and durable.

Each length of sill is 16 ft. 8 1/4 in. The joints are sealed with hydraulic iron cement. The bottom flange of the sill laps over and protects the outside edge of the wall, making an attractive finish. The upper flange provides a stop for the bottom rail of the ventilating or stationary sash.

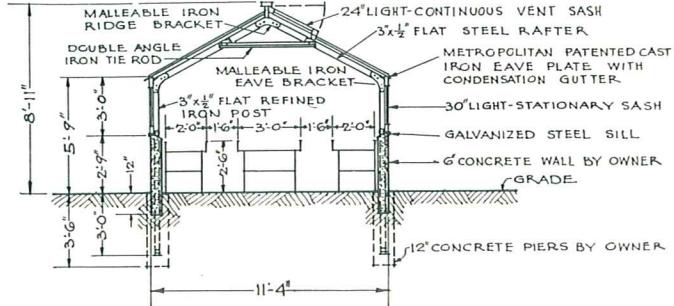
Wooden sills, where used in place of metal, are secured to sill knees which are bolted to each post. Where contact with the bottom rails of side ventilating sash is required, an adjustable sash stop provides for a tight joint when the ventilators are closed. A wide groove underneath provides for concrete bedding over a concrete wall, or insertion of sheathing and siding of a wooden wall.



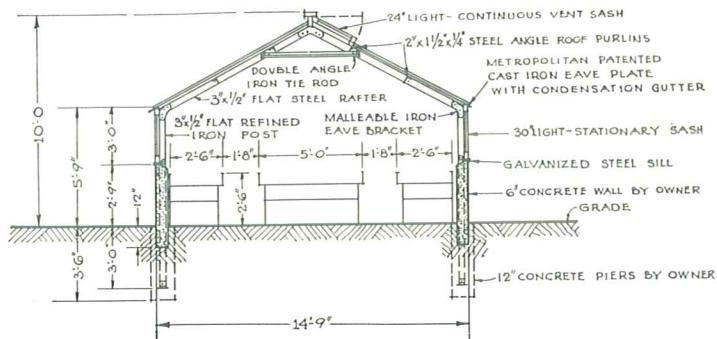
## Iron-frame greenhouses, low-eave



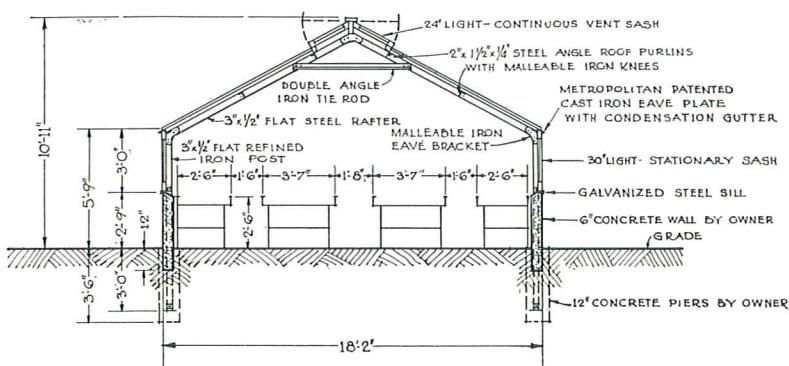
**No. 1499**—Width 8 ft. 0 in.—Passage house for connecting separate houses in a range, or for attaching a greenhouse to a boiler house, or work room.



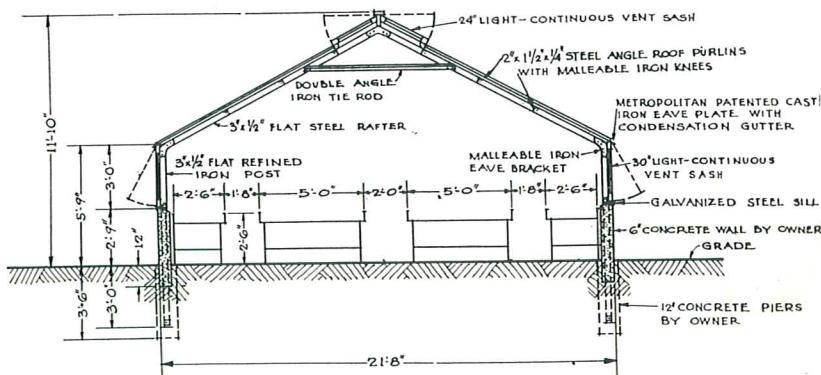
**No. 1500**—Width 11 ft. 4 in.—Recommended in 25 ft. length for either private use or as a propagating house in a commercial plant.



**No. 1501**—Width 14 ft. 9 in.—An ideal 3-bench house which can be built up to 50 ft. length.



**No. 1502**—Width, 18 ft. 2 in.—An excellent house for growing cut flowers. Lengths, up to 100 ft.



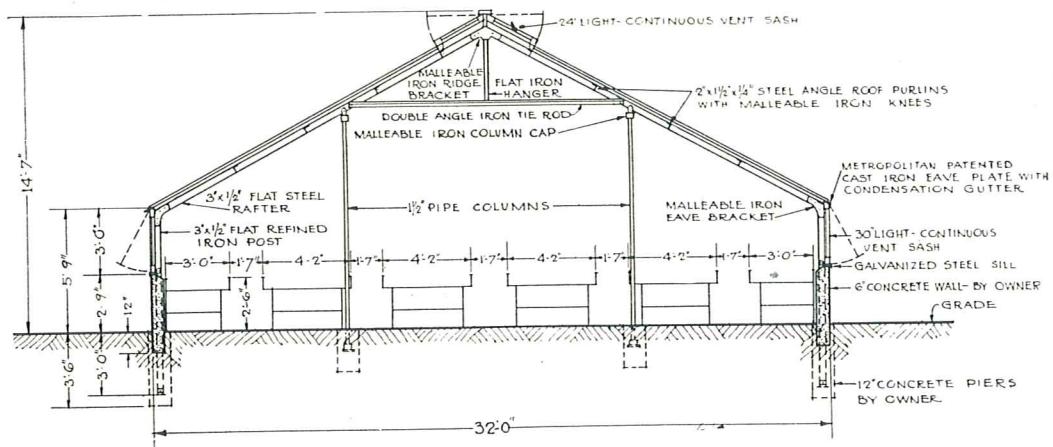
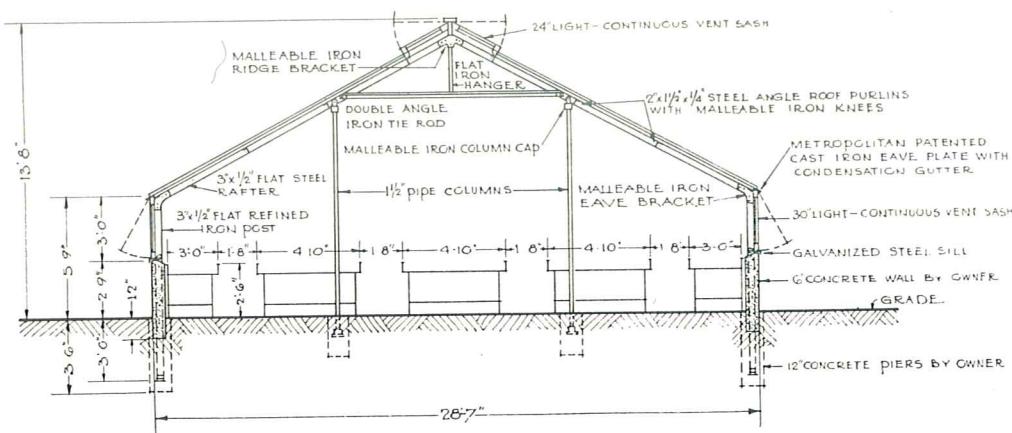
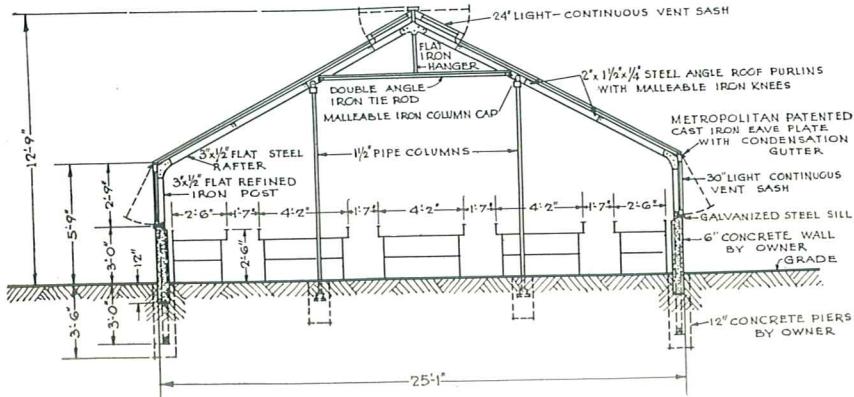
**No. 1503**—Width, 21 ft. 8 in.—Recommended where two 5-ft. center benches can be used to advantage, as in growing potted plants. Lengths, up to 150 ft.



## Iron-frame greenhouses, low-eave

**No. 1504**—Width, 25 ft. 1 in.—A 5-bench house of great strength and rigidity. Lengths, up to 150 ft.

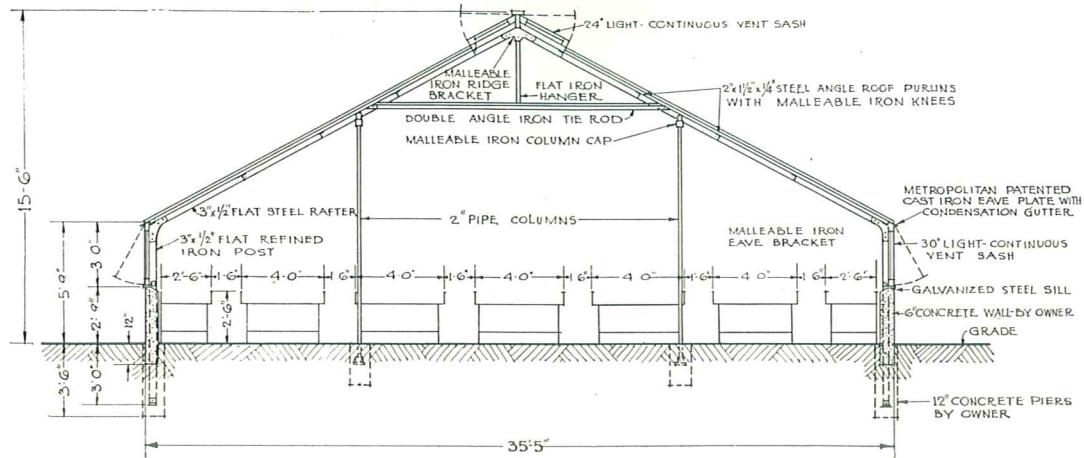
**No. 1505**—Width, 28 ft. 7 in.—An excellent 5-bench house for growing cut flowers to advantage, as the middle benches are 4 ft. 10 in. wide. This house can be used with 5 benches each 3 ft. 7 in. wide and 2 side walks 1 ft. 10 in. wide, as shown on No. 1513, Page 43, or it can be used with side walks and 4 benches 4 ft. 4 in. wide. In order to provide more head-room the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher. Lengths, up to 150 ft.



**No. 1506**—Width, 32 ft. 0 in.—An excellent 6-bench house for growing any kind of cut flowers. For bench arrangement with side walks and 5 benches 4 ft. 2 in. wide, see No. 1514, Page 43. In order to provide more head-room, the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher. Lengths, up to 200 ft.

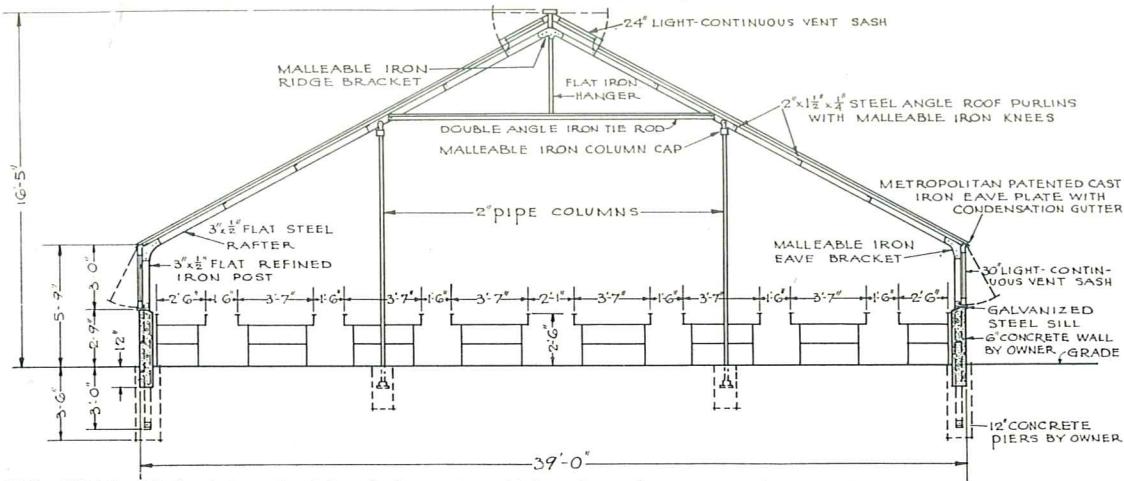


## Iron-frame greenhouses, low-eave



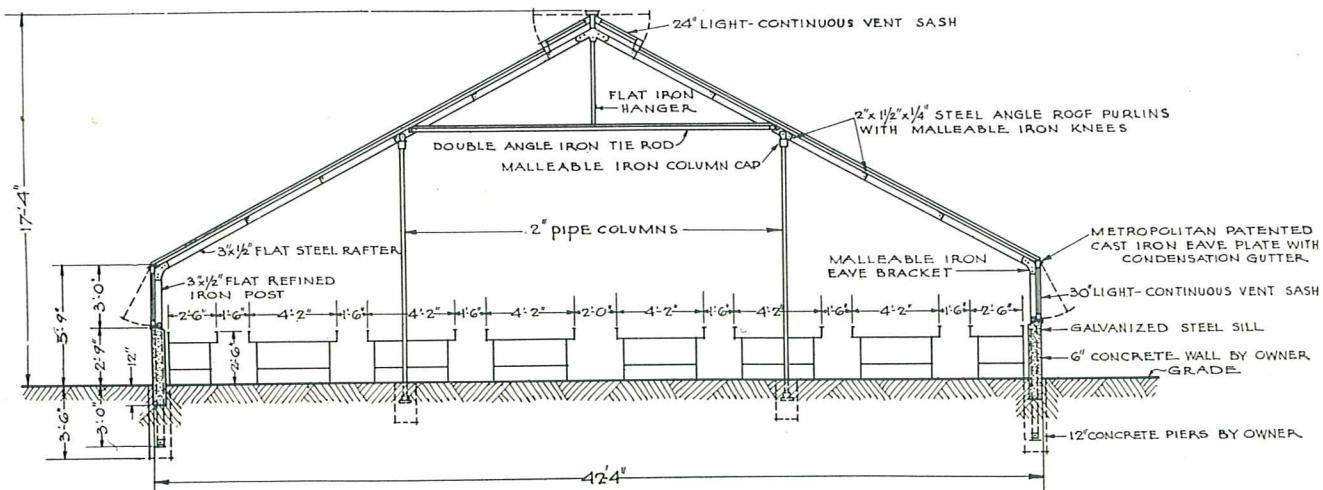
No. 1507—Width, 35 ft. 5 in.—A 7-bench house with benches of two different widths. Especially advantageous where a variety of cut flowers, plants, etc., is grown in the same house. When desired, 6 benches 3 ft. 8 in. wide can be used with side

walks as shown on No. 1515, Page 44. In order to provide more head-room, the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher. Lengths, up to 400 feet.



No. 1508—Width, 39 ft. 0 in.—An 8-bench house in which almost any cut flowers can be grown. When side walks are preferred in this house, 7 benches 3 ft. 7 in. wide can be used as shown on No. 1516, Page 44, or 6 benches 4 ft. 4 in. wide.

In order to provide more head-room, the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher. Lengths, up to 400 ft.

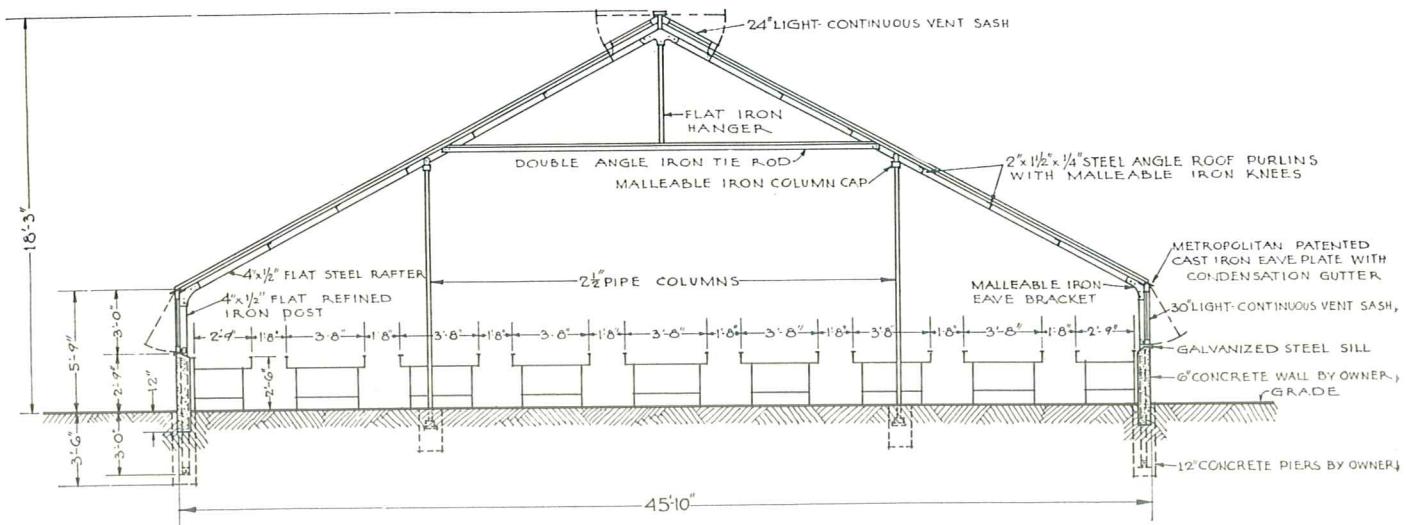


No. 1509—Width, 42 ft. 4 in.—An 8-bench standard greenhouse of a width which we recommend highly. The same arrangement as shown on No. 1517, Page 44, with 7 benches 4 ft. wide and 2 side walks can be used. In order to provide more

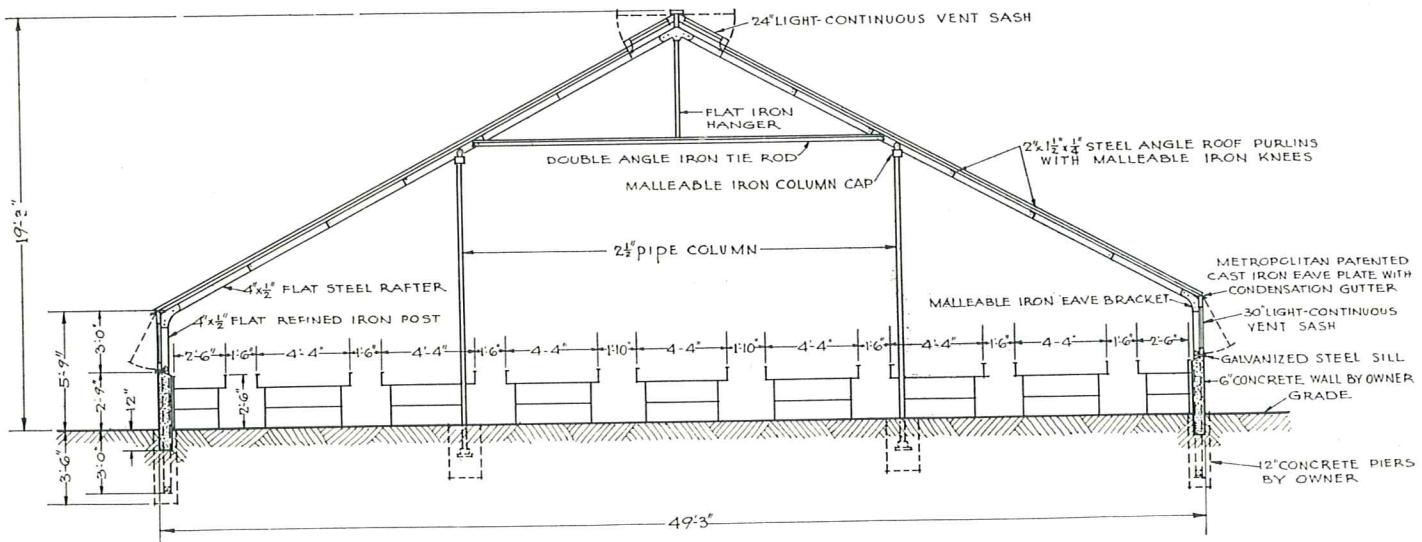
head-room, the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher. Lengths, up to 400 ft.



## Iron-frame greenhouses, low-eave



No. 1510—Width, 45 ft. 10 in.—An excellent 9-bench greenhouse where 3 ft. 8 in. wide benches are desirable. The above house can be built with 2 side benches 2 ft. 6 in. wide and 6 center benches 4 ft. 9 in. wide, or if narrower benches are desired with side walks, 8 benches 3 ft. 8 in. wide can be used as shown on No. 1518, Page 45. In order to provide more head-room the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher. Lengths, up to 400 ft.

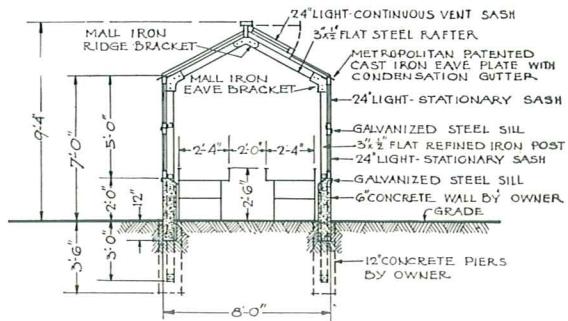


No. 1511—Width, 49 ft. 3 in.—A 9-bench greenhouse that is highly recommended in 400 ft. length for commercial use. The above bench arrangement may be changed to 9 benches 3 ft. 7 in. wide, as shown on No. 1519, Page 45. Another bench arrangement which can be used with the above house with side walks is 8 benches 4 ft. 2 in. wide. In order to provide more head-room, the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher. Lengths, up to 400 ft.

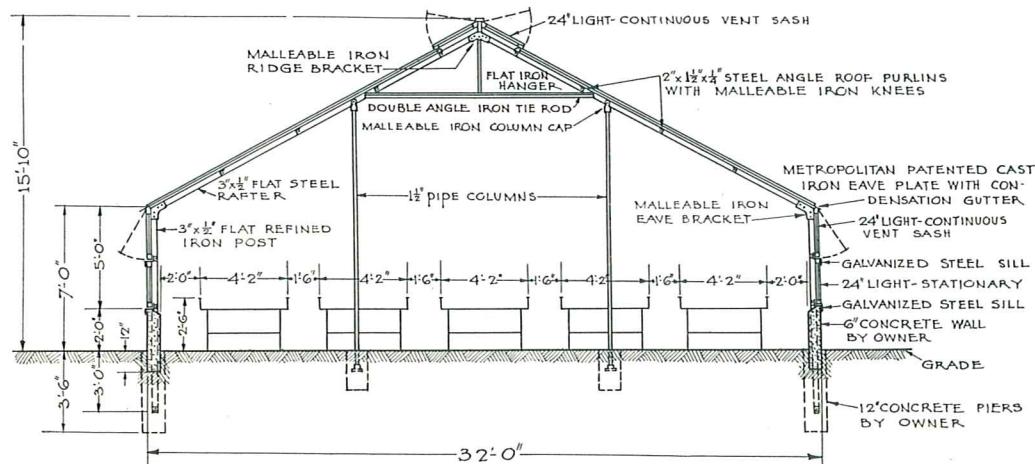
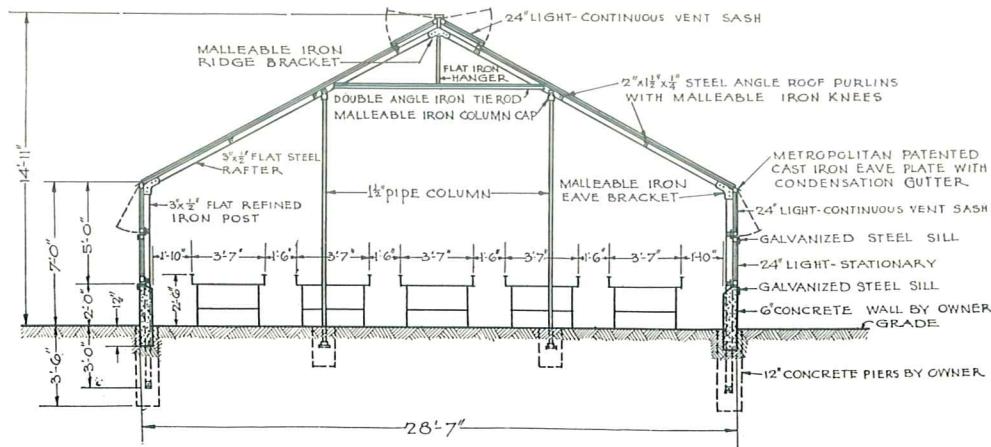


## Iron-frame greenhouses, high-eave

**No. 1512**—Width, 8 ft. 0 in.—Passage house for connecting large greenhouses in a range.



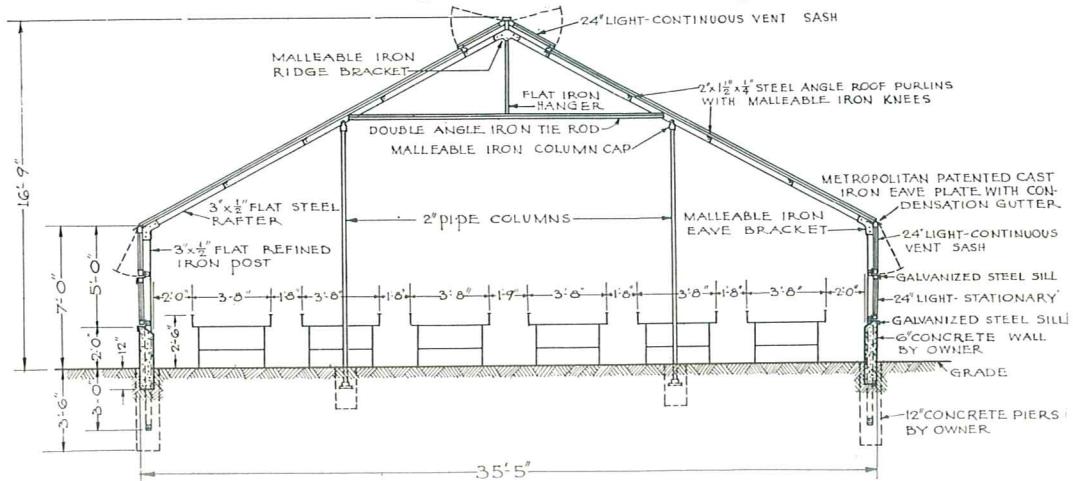
**No. 1513**—Width, 28 ft. 7 in.—A 5-bench house for growing any kind of cut flowers. Plants can be grown on benches, or roses, sweet peas, snap-dragons, etc., in solid beds. This house can be built with 4 benches 4 ft. 4 in. wide. Lengths, up to 150 ft.



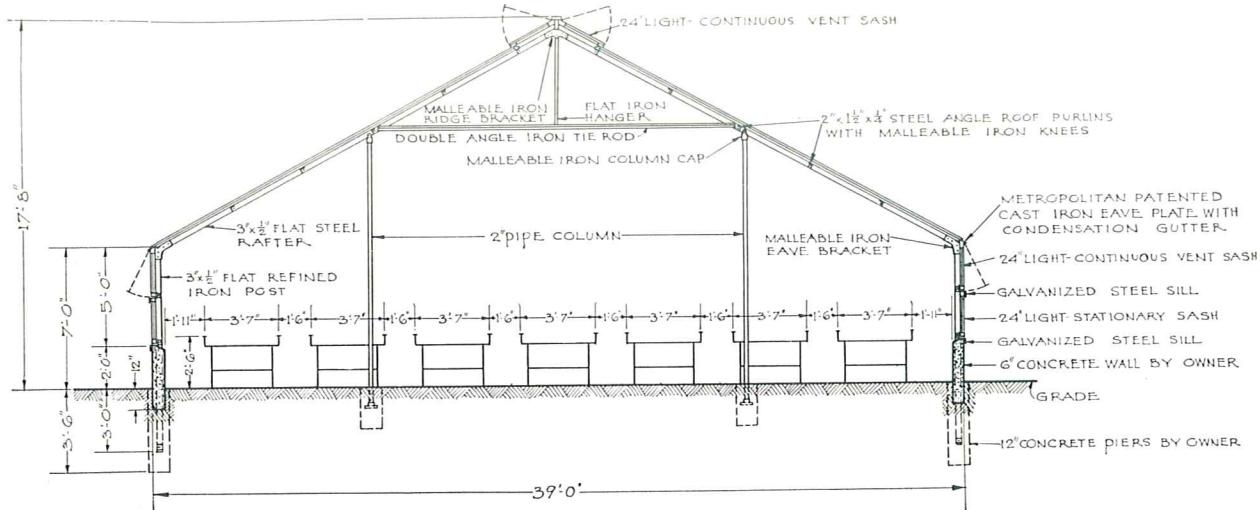
**No. 1514**—Width, 32 ft. 0 in.—A 5-bench house which is desirable with bench widths of 4 ft. 2 in. When wider benches are preferred, 4 benches 5 ft. 6 in. wide can be used with 2 side walks 2 ft. wide. Lengths, up to 200 ft.



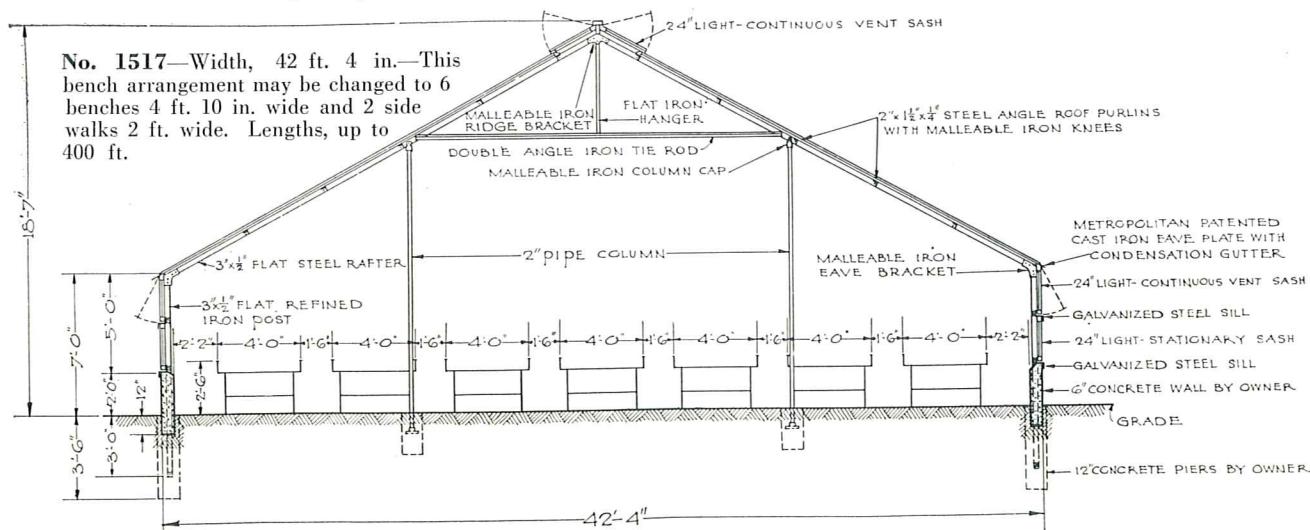
## Iron-frame greenhouses, high-eave



No. 1515—Width, 35 ft. 5 in.—A 6-bench house with 3 ft. 8 in. wide benches. For growing cut flowers, 5 benches 4 ft. 10 in. wide can be installed instead. Lengths, up to 400 ft.



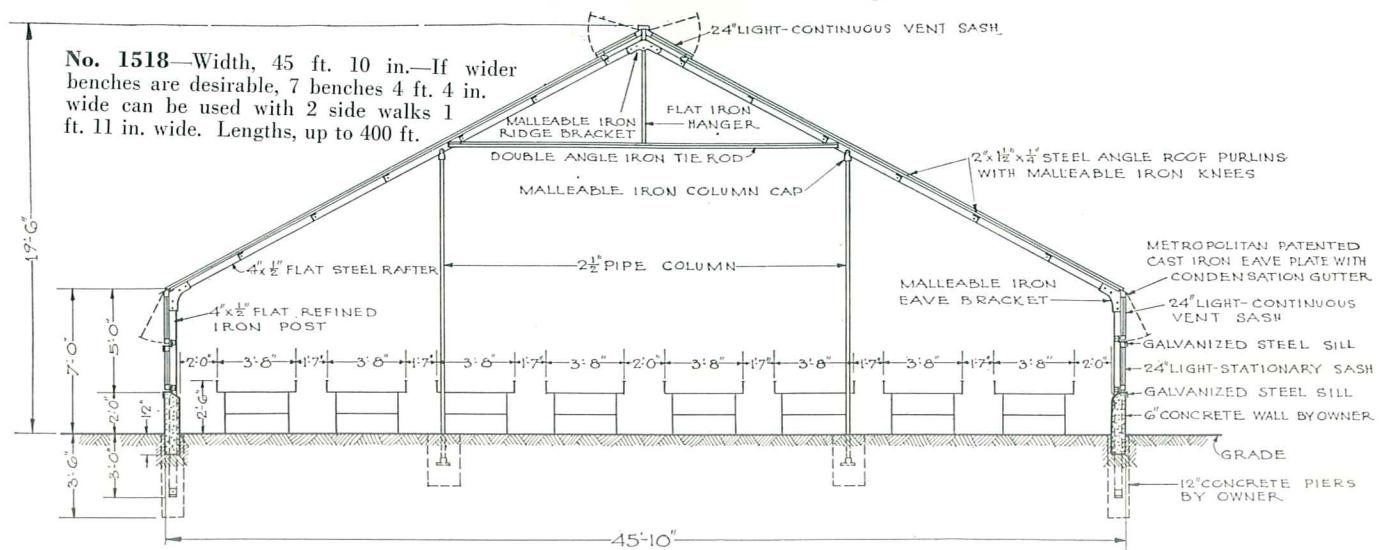
No. 1516—Width, 39 ft. 0 in.—A very desirable 7-bench house which we recommend highly for roses, etc. The above house can be built with 6 benches 4 ft. 4 in. wide and 2 side walks 2 ft. wide. Lengths, up to 400 ft.



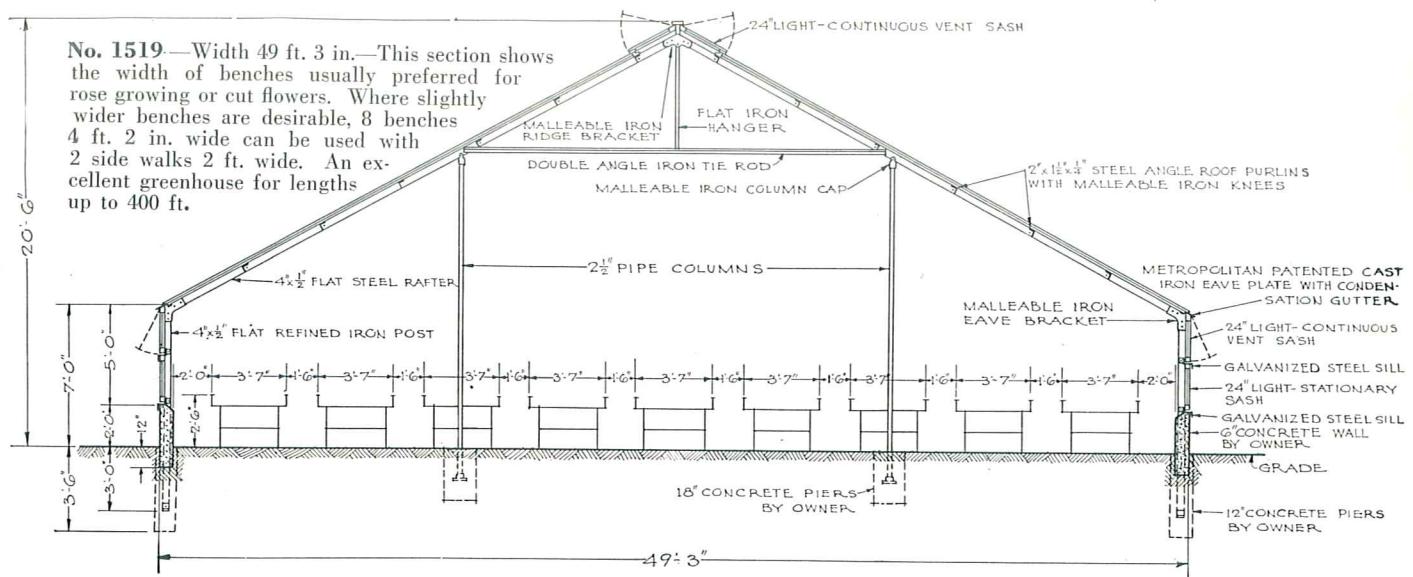


## Iron-frame greenhouses, high-eave

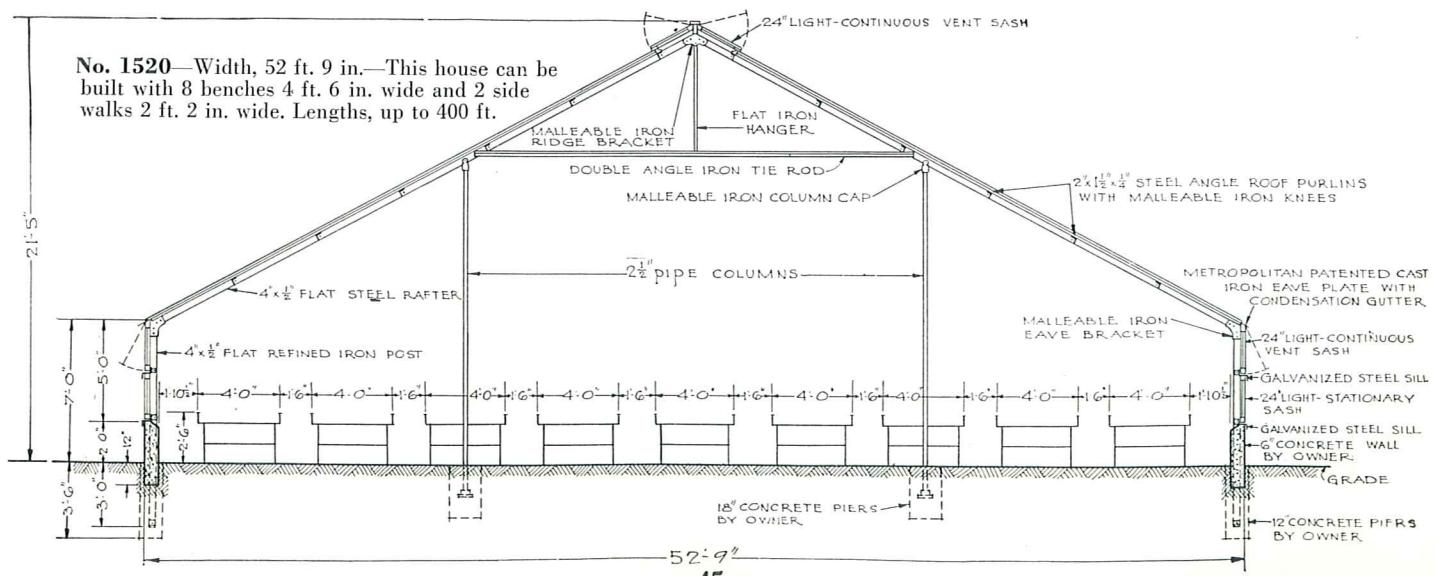
No. 1518—Width, 45 ft. 10 in.—If wider benches are desirable, 7 benches 4 ft. 4 in. wide can be used with 2 side walks 1 ft. 11 in. wide. Lengths, up to 400 ft.



No. 1519—Width 49 ft. 3 in.—This section shows the width of benches usually preferred for rose growing or cut flowers. Where slightly wider benches are desirable, 8 benches 4 ft. 2 in. wide can be used with 2 side walks 2 ft. wide. An excellent greenhouse for lengths up to 400 ft.

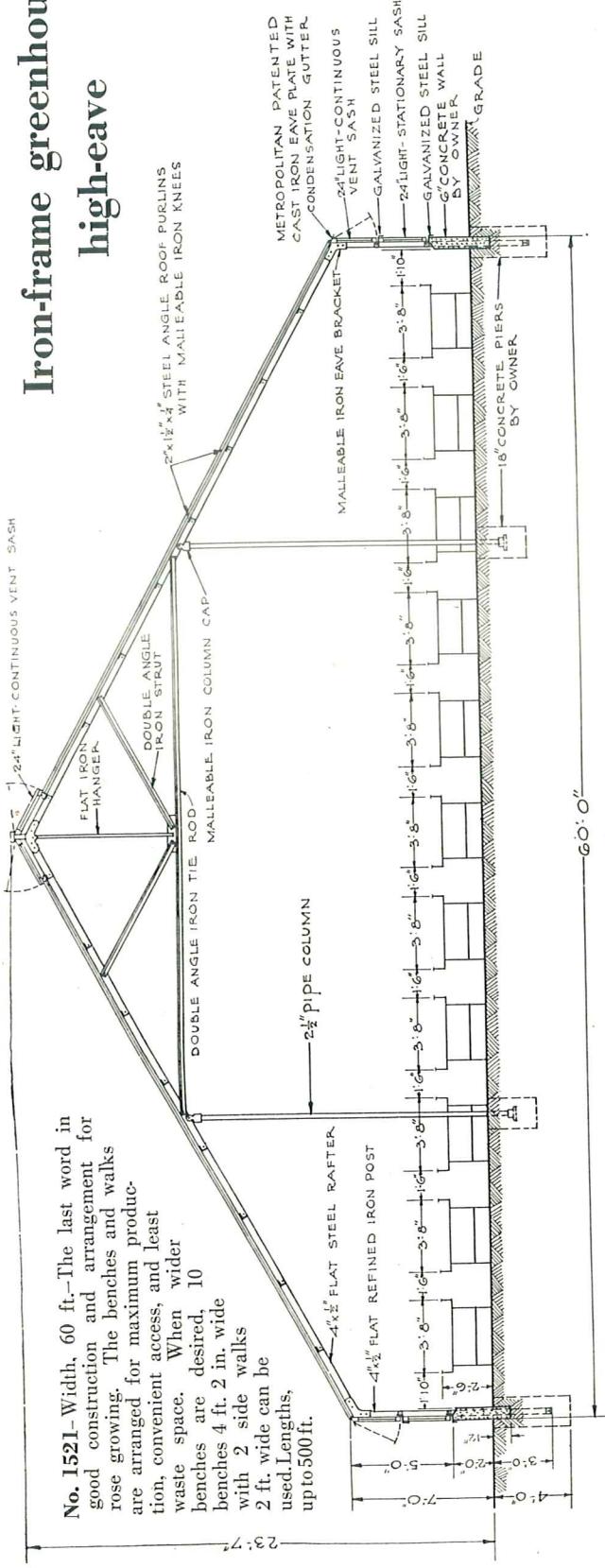


No. 1520—Width, 52 ft. 9 in.—This house can be built with 8 benches 4 ft. 6 in. wide and 2 side walks 2 ft. 2 in. wide. Lengths, up to 400 ft.

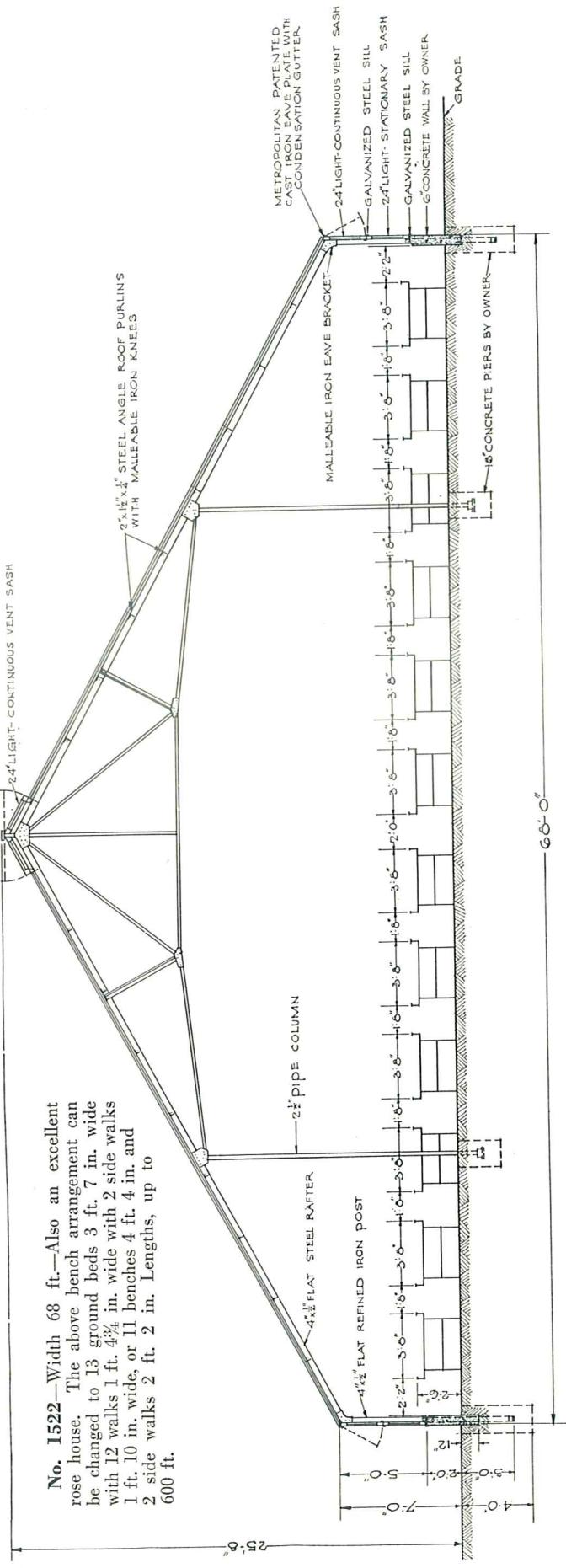


Iron-frame greenhouses,  
high-eave

**No. 1521**-Width, 60 ft.-The last word in good construction and arrangement for rose growing. The benches and walks are arranged for maximum production, convenient access, and least waste space. When wider benches are desired, 10 benches 4 ft. 2 in. wide with 2 side walks 2 ft. wide can be used. Lengths, up to 500 ft.



**No. 1522**—Width 68 ft.—Also an excellent rose house. The above bench arrangement can be changed to 13 ground beds 3 ft. 7 in. wide with 12 walks 1 ft. 4 $\frac{1}{4}$  in. wide with 2 side walks 1 ft. 10 in. wide, or 11 benches 4 ft. 4 in. and 2 side walks 2 ft. 2 in. Lengths, up to 600 ft.

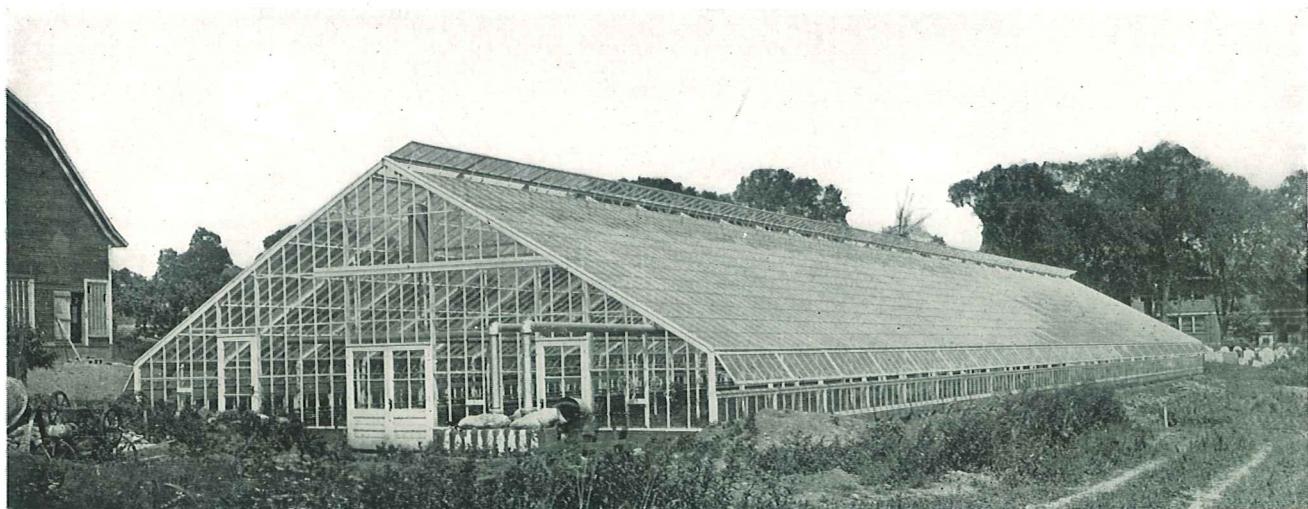




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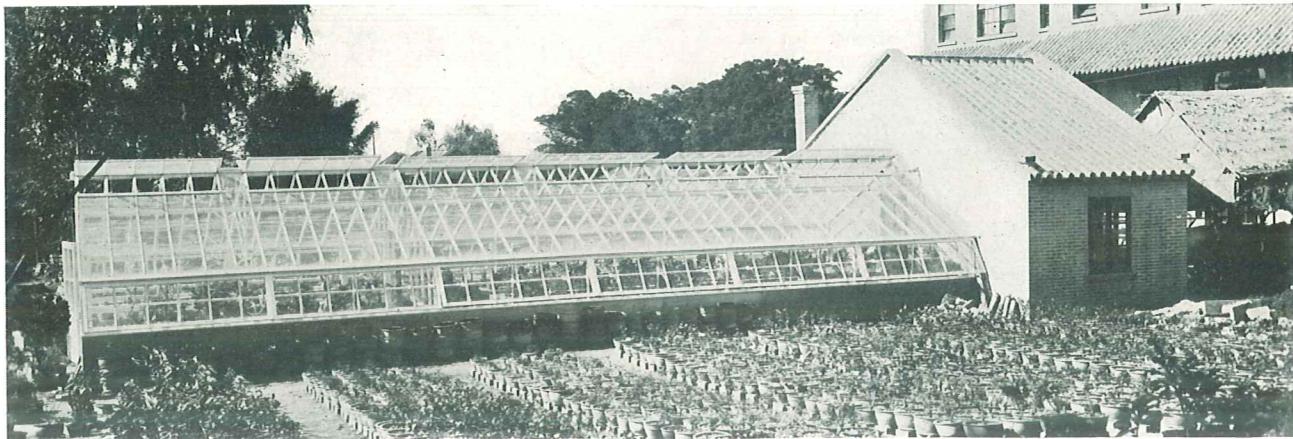


**E**XTERIOR and interior of 49-ft. 3-in. x 200-ft. Metropolitan Iron-frame Greenhouse with 7-ft. eave (No. 1519, Page 45), built for Harry J. Burke at Westfield, N. J. Note the clean cut construction and light interior.





## All over the world Metropolitan Greenhouses are well known



The completed Metropolitan Greenhouse, Lingnan University, Canton, China

### In Canton, China

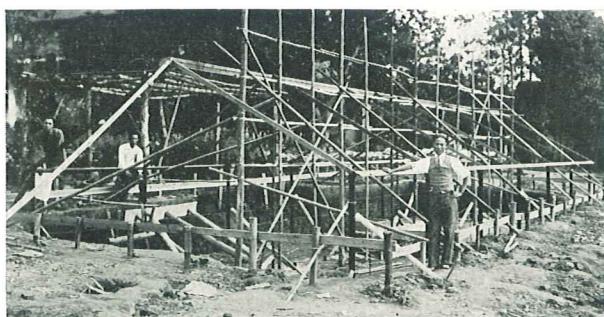


Greenhouse in service. Every part as well placed and efficient as though the erecting were done in our factory

THE 17-ft. 6-in. x 50-ft. Metropolitan Semi-iron-frame Greenhouse shown above and in the three detail views is owned by the College of Agriculture, Lingnan University, Canton, China. This greenhouse had to be assembled by unskilled native labor, but our simple instructions and the accurate fit with which all parts left our plant, permitted the erecting to be well done at low cost.

All material was furnished by us in ample quantity and well packed, so that distance cuts no figure in speedily completing the construction on arrival of the parts.

These three foreign projects are all important in their respective communities—and in charge of men who must necessarily have outstanding greenhouse experience and discretion in purchasing. These officials knew when specifying Metropolitan Greenhouses, that they were getting the best, that they could place their orders with us in absolute confidence, and that the handicap of having to do the erecting with untrained labor would not impair the completed structures.



Starting the erection with bamboo poles as temporary supports

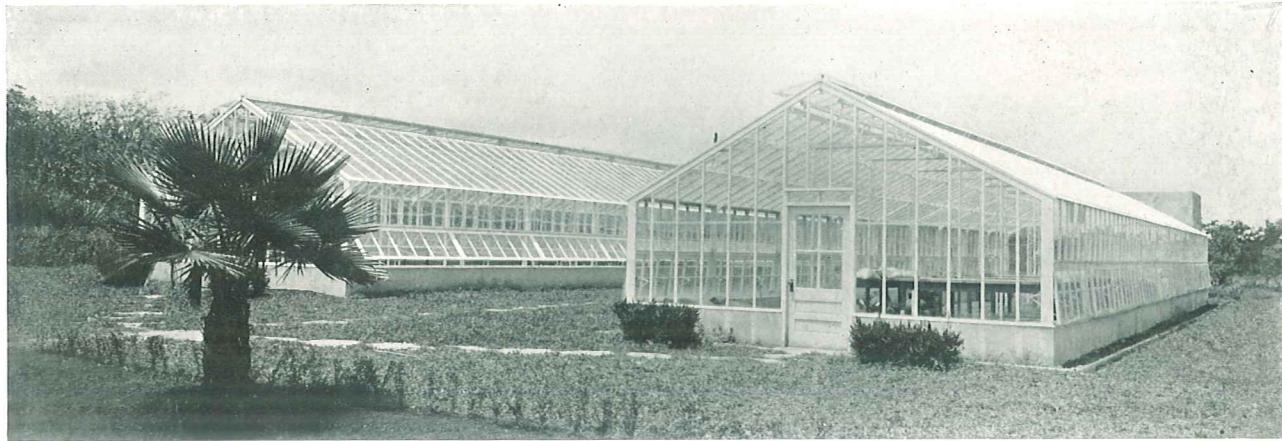


All the roof bars in place



METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N.Y.

## Three Greenhouses for the Porto Rican Government



At the Insular Experiment Station, Department of Agriculture, Porto Rico, the Metropolitan installation consists of two 20-ft. x 75-ft. Metropolitan Iron-frame Greenhouses and a 17-ft. 6-in. x 50-ft. Metropolitan Semi-iron-frame Greenhouse. All three have met every requirement well. The height of the foundations was increased 3 inches over the standard to meet tropical conditions.

The material was shipped from the plant with plans and marking for erection, but neither the erecting superintendent nor his laborers had ever had any experience with a greenhouse job. The appearance of the finished job, as shown in the picture is ample evidence that all material assembled correctly and that these greenhouses are well able to meet their requirements.

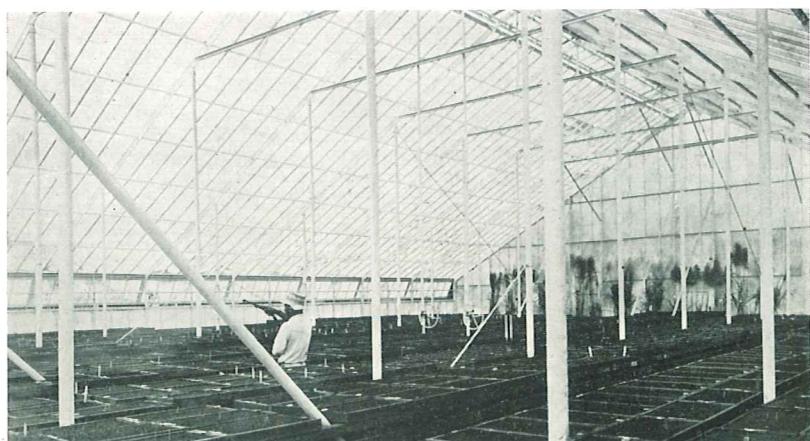
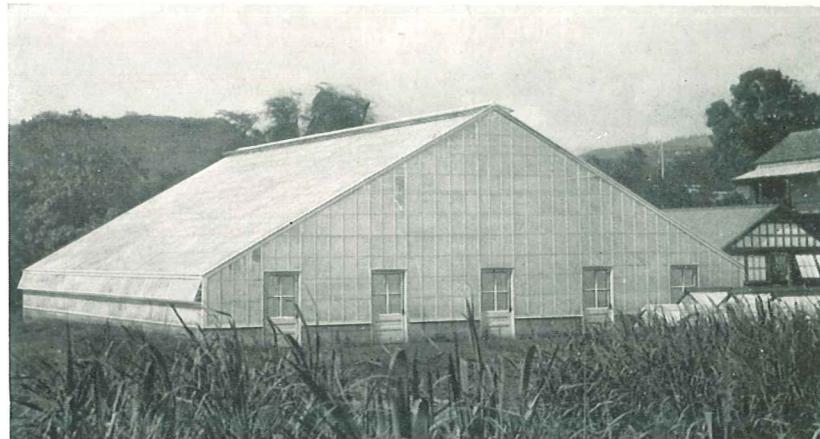
### The finest greenhouse in Hawaii

The Hawaiian Sugar Planters Association wanted the best greenhouse they could buy for propagation of sugar cane seedlings, and to act as a shelter in bad weather at their Experiment Station in Honolulu. As the winter storms there are severe, great strength was a prime consideration, and as experienced greenhouse construction men are not available in Hawaii, a house that could also be put together without special effort was essential.

The standard Metropolitan Iron-frame Type was selected as ideal to meet every requirement. After the above 60-ft. wide greenhouse went into service, the Director, H. P. Agee, wrote us as follows: "This is the first important greenhouse built in Hawaii.

*Your material arrived in excellent condition and was erected without trouble. We are well satisfied with the design."*

The Association later purchased a duplicate of this greenhouse and a third Metropolitan Iron-frame Greenhouse of a different size.



METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N.Y.



METROPOLITAN recently built these two iron-frame greenhouses 42 ft. wide x 250 ft. in length for Laisy Gardens, North Olmsted, Ohio. Construction on the greenhouses was started on June 28th and the owner commenced planting August 6th.

The plant included a Metropolitan Low-pressure Steam Heating System, the boiler of which was set on grade and an automatic electric condensation pump returns the condensation to the boiler. All the coils are equipped with traps, permitting the air to escape but letting no steam out.

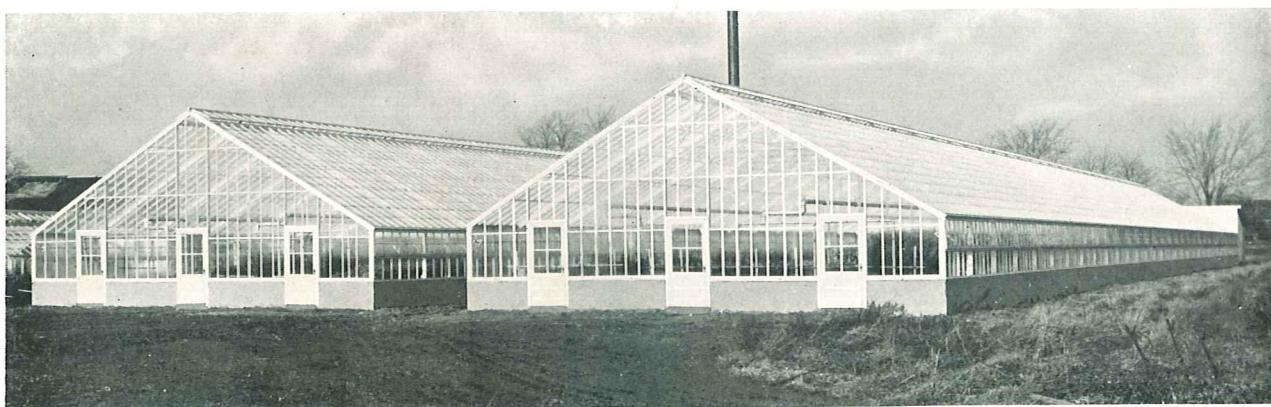
Mr. Laisy writes:

"We looked over a great many houses—of all types of constructions and I believe we have the more light and the

strongest construction than any I have seen. The roof clears quickly due to the greater pitch. We figured on seven cars of coal and we will get through with four. We haven't had a cracked glass and don't know of a leak. We have had two spells of zero weather and have not used more than one-half of the coils at any time.

"The material and type of construction is all we could ask for, your erection crew always had the paint pot at hand, and I noticed that every cut was well covered before assembly.

"All in all we can honestly say that we are more than pleased—needless to say that when we are again in the market, Metropolitan will have first call."





## Metropolitan Semi-iron-frame Greenhouses

With the Metropolitan patented cast-iron eave and gutter plate and wooden sill

Low-eave type in widths from 10 ft. 7 in. to 41 ft. 7 in.

High-eave type in widths from 24 ft. 4 in. to 41 ft. 7 in.

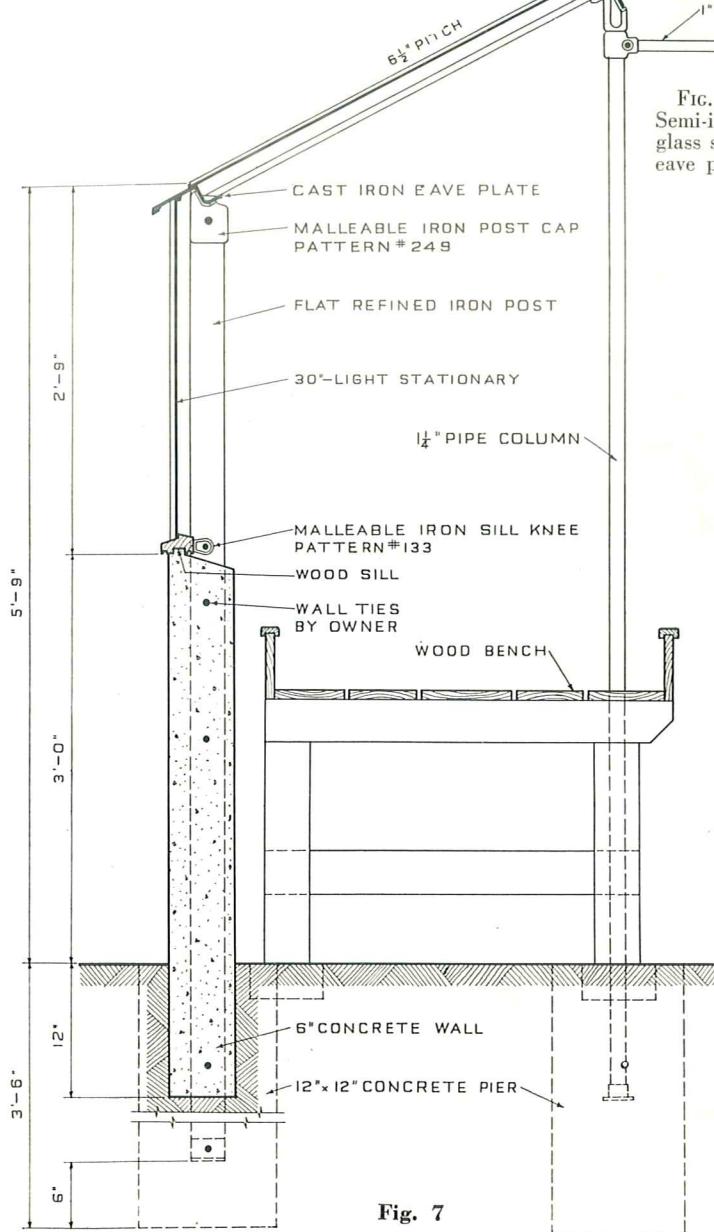


Fig. 7

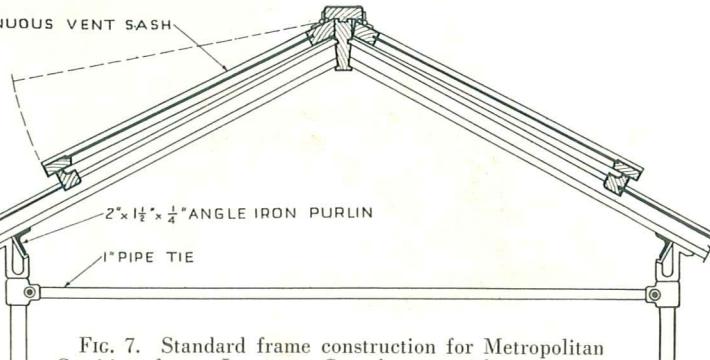


FIG. 7. Standard frame construction for Metropolitan Semi-iron-frame Low-eave Greenhouses with stationary glass showing section and details at posts, with cast iron eave plate and wooden sill on concrete wall.

THESE greenhouses admit the maximum amount of light and are highly recommended to those who want narrow or moderate width, but do not see their way clear to make the somewhat higher investment required for iron-frame construction. For greater width than 41 ft. 7 in., we consider Metropolitan Iron-frame Greenhouses (Pages 27 to 46) essential, because of the very large roof area subjected to wind pressure and snow accumulation. Under this extreme test, no other construction can be expected to have the rigidity produced by well tied heavy iron rafters.

For the widths shown in the following pages, the semi-iron-frame construction is amply strong to withstand any storm or snowfall, and will wear and last every bit as well as the iron-frame construction. The walls of both are built in exactly the same way. The principal difference between the two constructions is that the purlins, instead of being bolted to iron rafters, are supported in the semi-iron-frame house by pipe columns, and under this condition, a somewhat different system of tying is required to keep the roof from sagging and imposing side thrust upon the side walls. Also, the wooden roof bars are made of larger section, 1 3/8 in. x 2 1/4 in., to compensate for loss of strength through wide spacing of the purlins. The roof bars have condensation drip grooves.



## Semi-iron-frame greenhouses, low-eave with iron eave plate and steel sill

FIG. 8. Standard frame construction for Metropolitan Semi-iron-frame Greenhouses of the low-eave type with side walls of ventilating sash showing section and details at posts with cast-iron eave plate and galvanized steel sill on concrete walls.

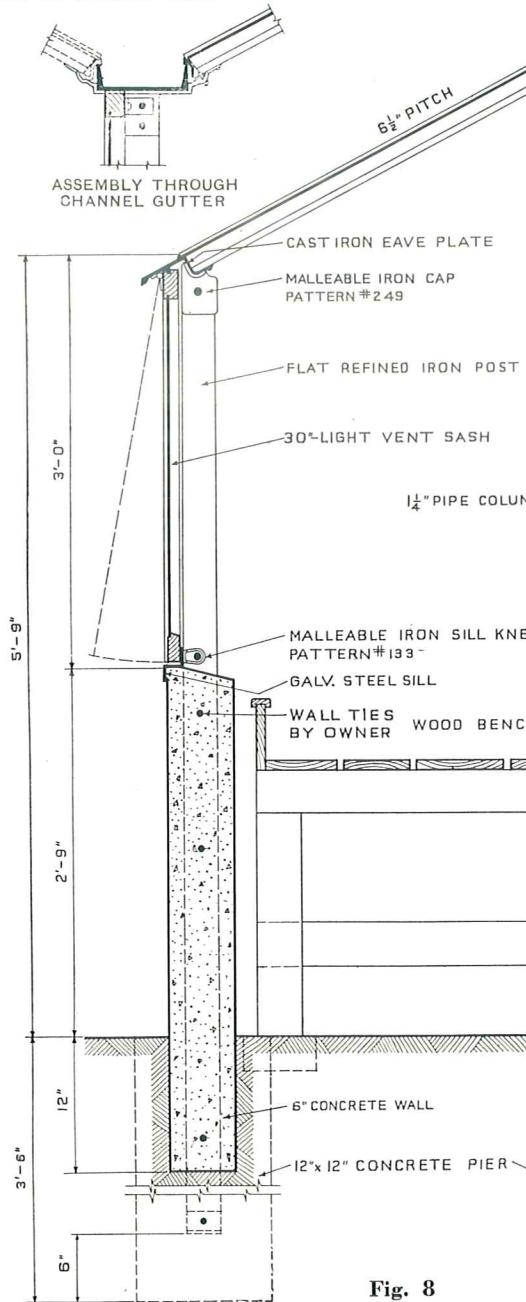
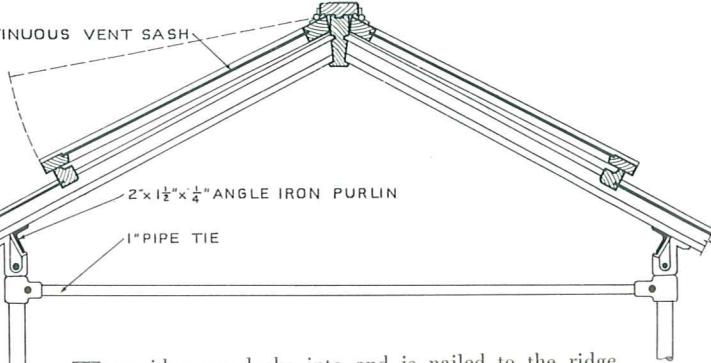


Fig. 8



THE ridge cap locks into and is nailed to the ridge bar and overhangs the top sash rail in a way to make a leak-proof joint when sash are closed. Sash hinges are attached to the cap. The bottom rail of the sash when closed rests on a wooden vent header containing groove for roof glass and is notched into the sash bars. Tapered vent seats extending from ridge to vent headers and fitting over the sash bars are used at the terminals of continuous sash runs and at each end of non-continuous sash to close the space under the sash.

The roof purlins are of .15 to .25 per cent carbon structural steel angles and are 2 in. x 1 1/2 in. x 1/4 in. in size. They are secured to the roof bars with galvanized screws.

The pipe columns, in one to four rows, depending upon the width of the house, are securely bolted to the purlins by cast iron caps which seal the inside of the column against the entrance of moisture. The bottoms of the columns are set in cast iron bases in concrete piers. Columns set in two or more rows are fixed against lateral movement by a system of horizontal pipe tie rods, and intermediate purlins are braced by pipe struts fastened to the columns. Split and bolted fittings are used throughout for connections between purlins, columns, struts and tie rods. Where desirable these fittings are adjustable with case-hardened set screw.

The eave construction and in joined houses the gutter construction are substantially the same as described on Pages 27 and 31 for iron-frame houses, but with brackets simplified by the eliminations of metal rafter connections.



**Semi-iron-frame greenhouses, high-eave  
with iron eave plate and steel sill**

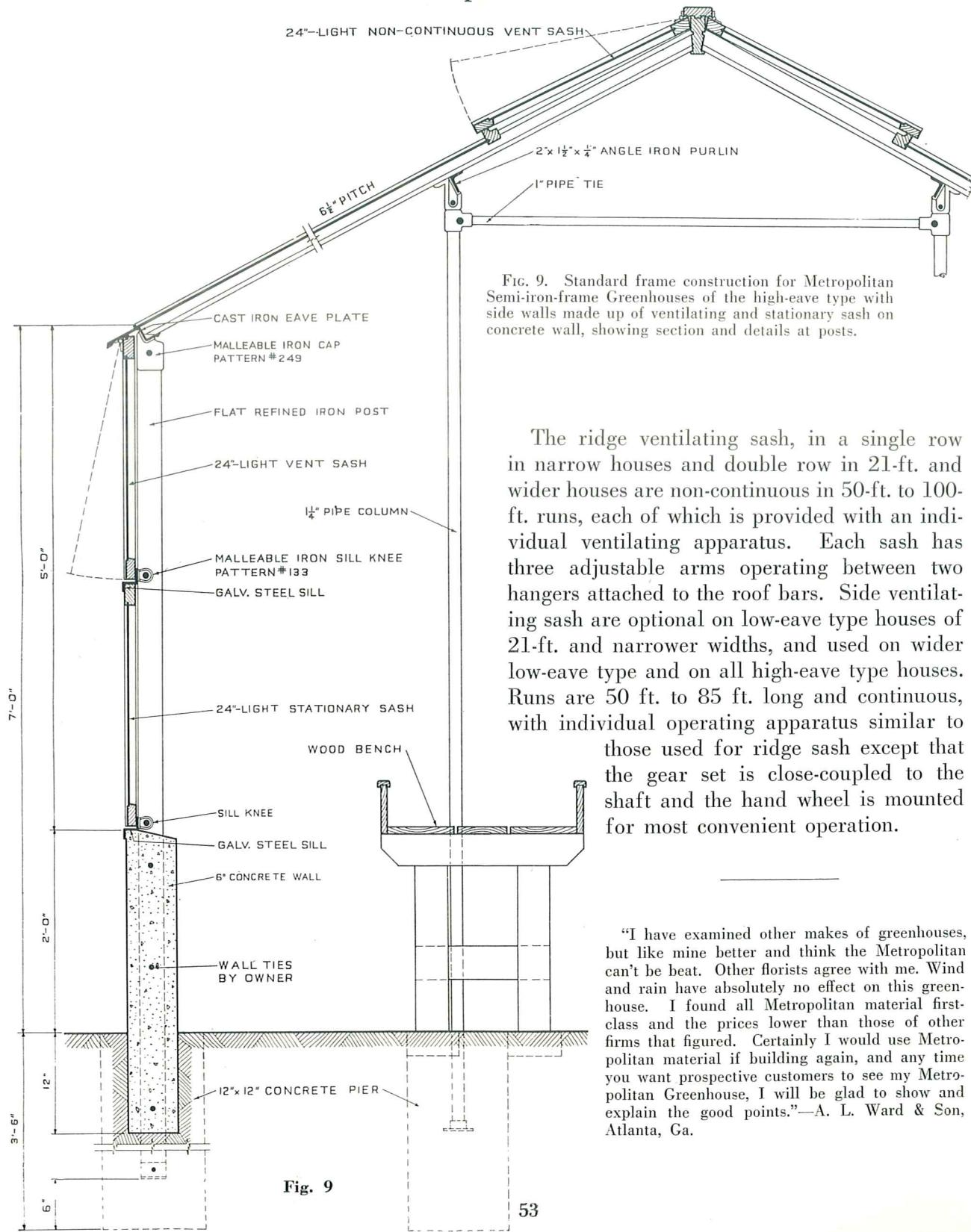


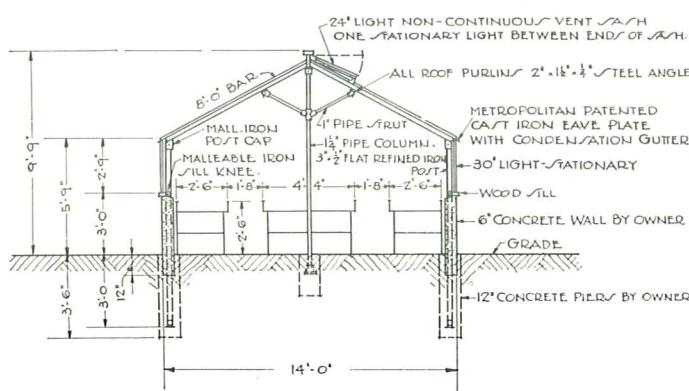
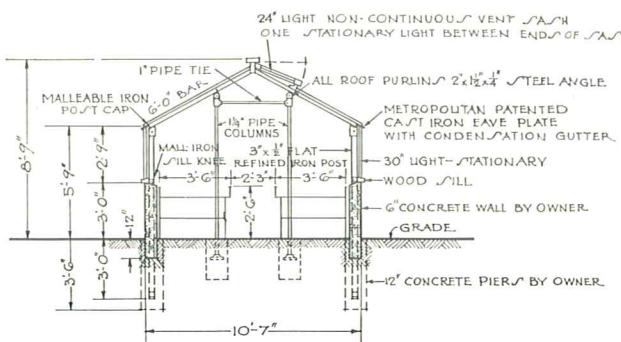
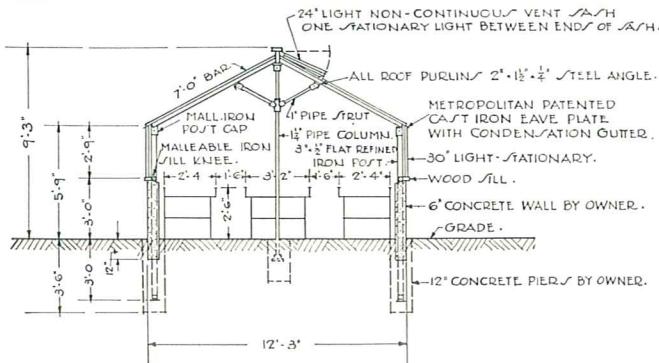
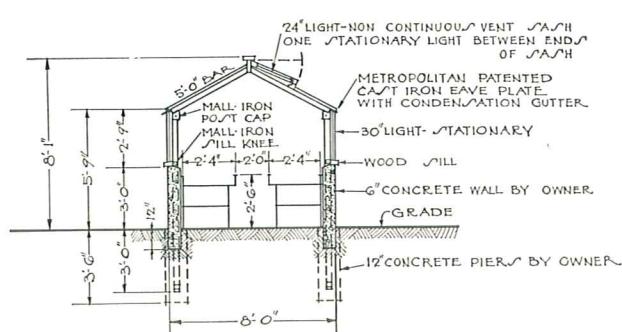
FIG. 9. Standard frame construction for Metropolitan Semi-iron-frame Greenhouses of the high-eave type with side walls made up of ventilating and stationary sash on concrete wall, showing section and details at posts.

The ridge ventilating sash, in a single row in narrow houses and double row in 21-ft. and wider houses are non-continuous in 50-ft. to 100-ft. runs, each of which is provided with an individual ventilating apparatus. Each sash has three adjustable arms operating between two hangers attached to the roof bars. Side ventilating sash are optional on low-eave type houses of 21-ft. and narrower widths, and used on wider low-eave type and on all high-eave type houses. Runs are 50 ft. to 85 ft. long and continuous, with individual operating apparatus similar to those used for ridge sash except that the gear set is close-coupled to the shaft and the hand wheel is mounted for most convenient operation.

"I have examined other makes of greenhouses, but like mine better and think the Metropolitan can't be beat. Other florists agree with me. Wind and rain have absolutely no effect on this greenhouse. I found all Metropolitan material first-class and the prices lower than those of other firms that figured. Certainly I would use Metropolitan material if building again, and any time you want prospective customers to see my Metropolitan Greenhouse, I will be glad to show and explain the good points."—A. L. Ward & Son, Atlanta, Ga.



**Semi-iron-frame greenhouses, low-eave  
with iron eave plate and wooden sill**



**No. 1529**—Width, 8 ft. 0 in.—Passage house for connecting large houses together or for connecting the greenhouse to the service house.

**No. 1530**—Width, 10 ft. 7 in.—Excellent for private use or for propagating in a commercial plant. Length, 25 ft.

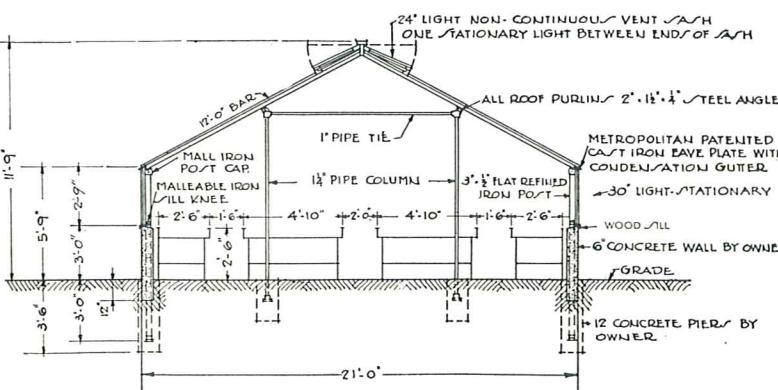
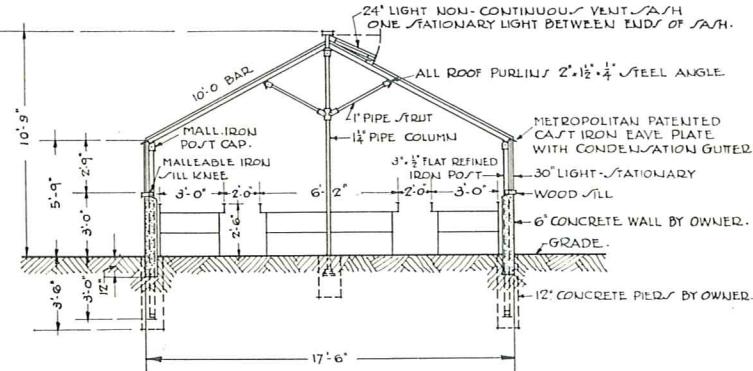
**No. 1531**—Width, 12 ft. 3 in.—A good 3-bench greenhouse for private use. Length, 25 ft.

**No. 1532**—Width, 14 ft. 0 in.—Similar to No. 1531, but with much more bench space. Length may be extended to 50 ft. where used for commercial propagating.

**No. 1533**—Width, 17 ft. 6 in.—A good 3-bench greenhouse where wide benches are preferred. Lengths, about 100 ft.

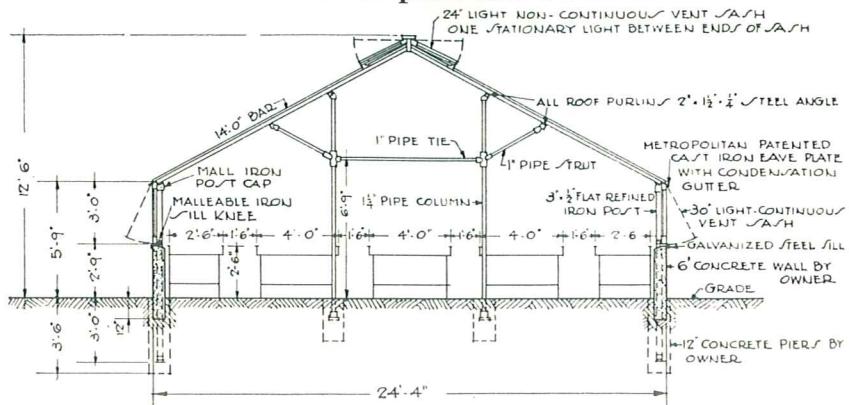
**No. 1534**—Width, 21 ft. 0 in.—A very practical standard 4-bench greenhouse of excellent size, particularly good for a beginner. Length, up to 150 ft.

In order to provide more head-room, the eave height may be increased to 6 ft. without any additional cost by building the concrete walls higher on any of the above houses.

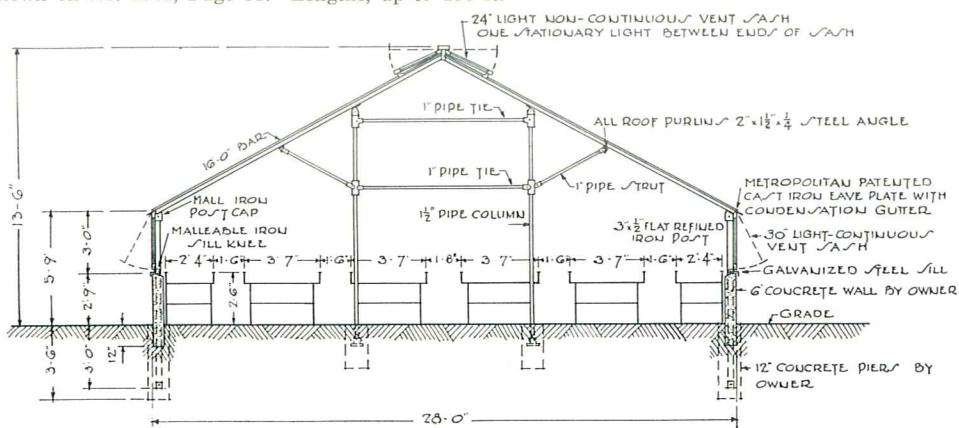




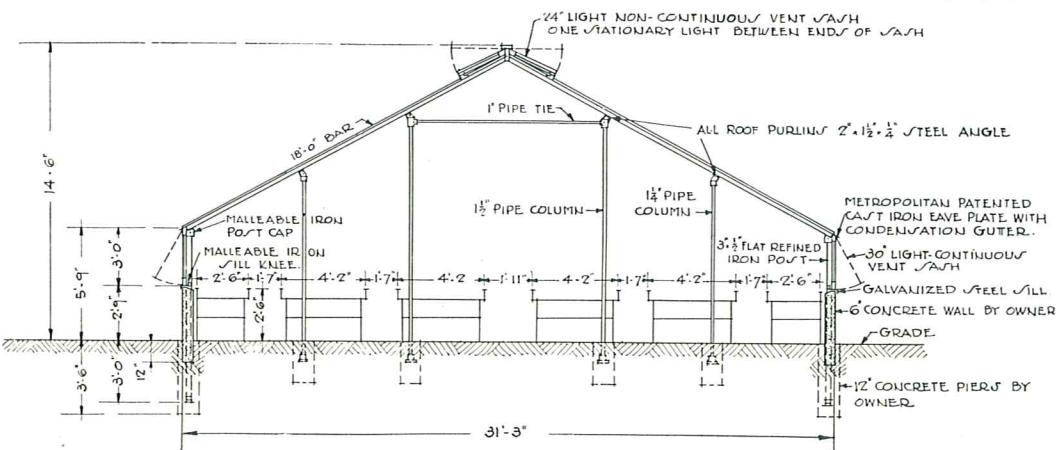
**Semi-iron-frame greenhouses, low-eave  
with iron eave plate and steel sill**



**No. 1535**—Width, 24 ft. 4 in.—When wider benches are preferred, 2 side benches 2 ft. 9 in. can be used and 2 center benches, 5 ft. 9 in. wide, or if bench arrangement with 2 side walks is desired, 4 benches 3 ft. 8 in. wide can be installed as shown on No. 1541, Page 58. Lengths, up to 150 ft.



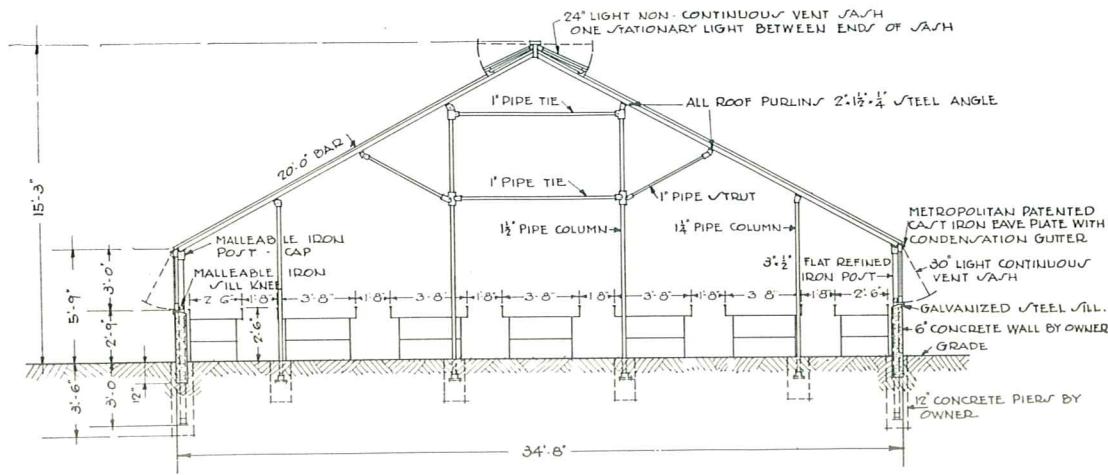
**No. 1536**—Width, 28 ft.—Standard 6-bench greenhouse for general use. This house can be built with 3 benches 5 ft. wide and 2 side benches 2 ft. 6 in. wide. If side walks are desired 5 benches 3 ft. 6 in. wide and 2 side walks 1 ft. 9 in. wide, can be installed as shown on No. 1542, Page 58, or 4 benches 4 ft. 6 in. wide and 2 side walks 2 ft. wide can be used instead. Lengths, up to 150 ft.



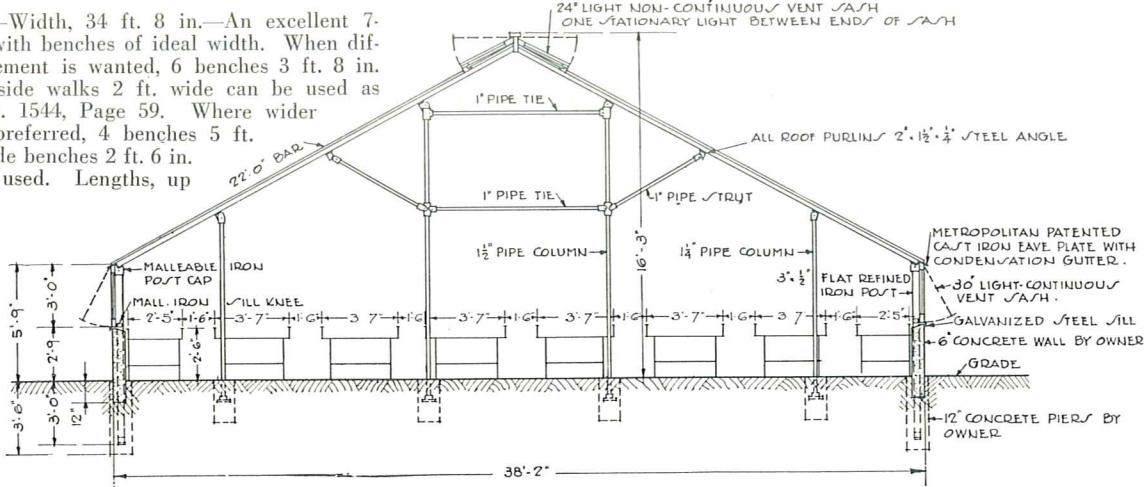
**No. 1537**—Width 31 ft. 3 in.—When narrower benches are required, the same arrangement as shown on No. 1543, Page 58, can be used with 5 benches 4 ft. wide and 2 side walks 2 ft. wide, but on the other hand, if side benches are desirable with wider center benches, 2 side benches 3 ft. wide and 3 center benches 5 ft. 9 in. wide can be installed. Lengths, up to 200 ft.



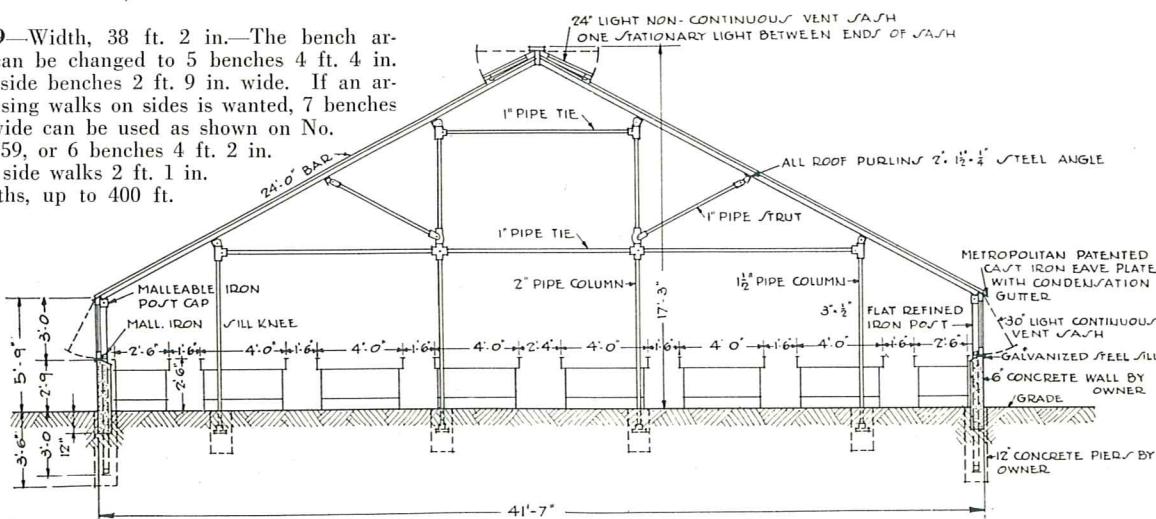
**Semi-iron-frame greenhouses, low-eave  
with iron eave plate and steel sill**



**No. 1538**—Width, 34 ft. 8 in.—An excellent 7-bench house with benches of ideal width. When different arrangement is wanted, 6 benches 3 ft. 8 in. wide with 2 side walks 2 ft. wide can be used as shown on No. 1544, Page 59. Where wider benches are preferred, 4 benches 5 ft. wide and 2 side benches 2 ft. 6 in. wide can be used. Lengths, up to 400 ft.



**No. 1539**—Width, 38 ft. 2 in.—The bench arrangement can be changed to 5 benches 4 ft. 4 in. wide and 2 side benches 2 ft. 9 in. wide. If an arrangement using walks on sides is wanted, 7 benches 3 ft. 6 in. wide can be used as shown on No. 1545, Page 59, or 6 benches 4 ft. 2 in. wide and 2 side walks 2 ft. 1 in. wide. Lengths, up to 400 ft.

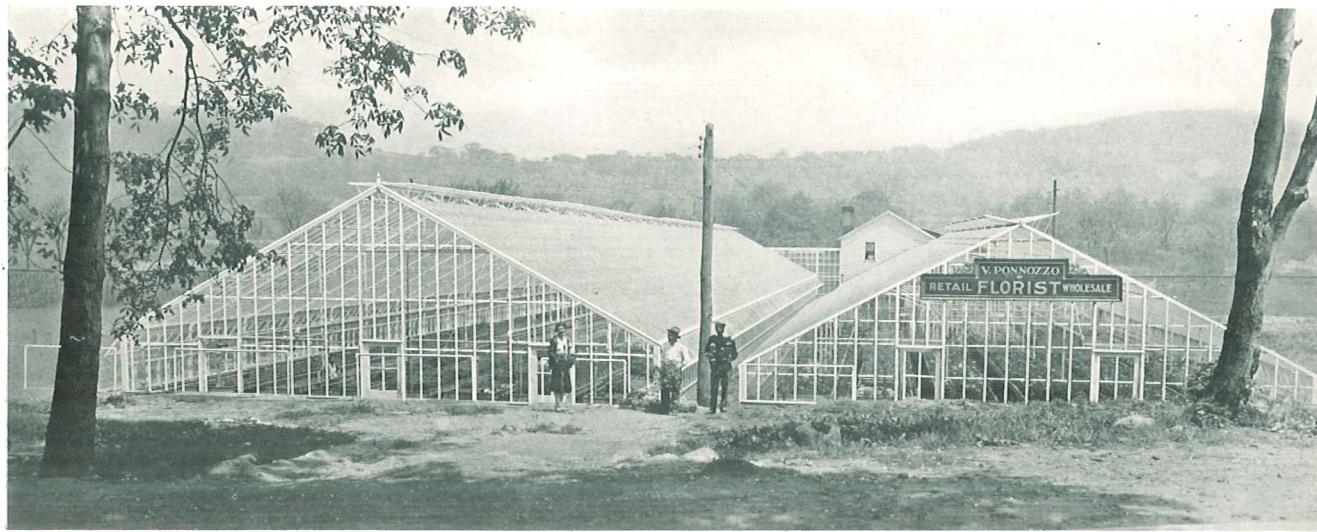


**No. 1540**—Width, 41 ft. 7 in.—An 8-bench house for growing cut flowers. When side walks are preferred with this house, 7 benches 3 ft. 10 in. wide can be used with 2 side walks, 2 ft. wide, as shown on No. 1546, Page 59. Lengths, up to 400 ft.



## METROPOLITAN GREENHOUSE MFG. CORP.

BROOKLYN, N.Y.



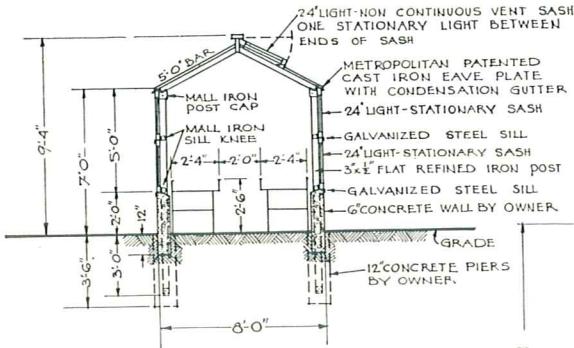
Mr. VINCENT PONNOZZO, of Danbury, Conn., purchased his first Metropolitan Greenhouse, a complete semi-iron-frame house, 38 ft. 2 in. wide by 125 ft. long, back in 1928. He liked this greenhouse so well that he built his second Metropolitan semi-iron-frame greenhouse the following year. Early in 1931 Mr. Ponnozzo bought his third Metropolitan, this time an iron-frame house 42 ft. 4 in. wide x 200 ft. 7 in. long.

Mr. Ponnozzo says: "There is no better, tighter and lighter greenhouse in this vicinity than my Metropolitan, nor have I seen any heating system that could beat or come close to mine, which keeps uniform temperature with the greatest ease even in the coldest spell. The builder was honest and pleasing to do business with, and if I build another greenhouse, you can rest assured it will be a Metropolitan."

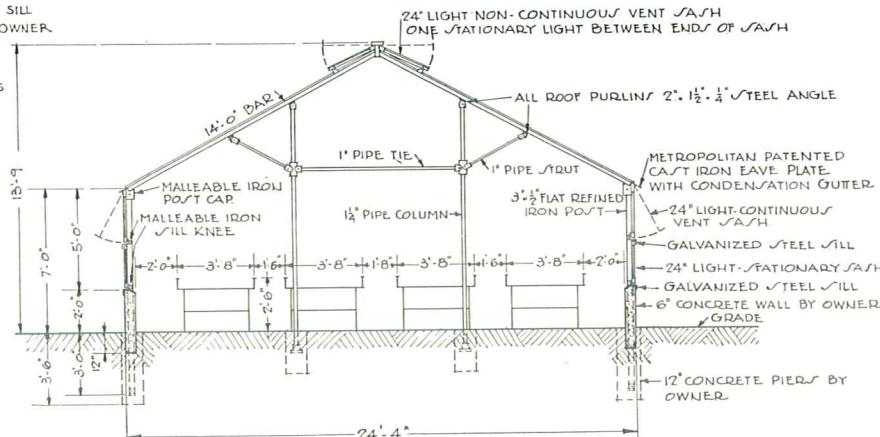




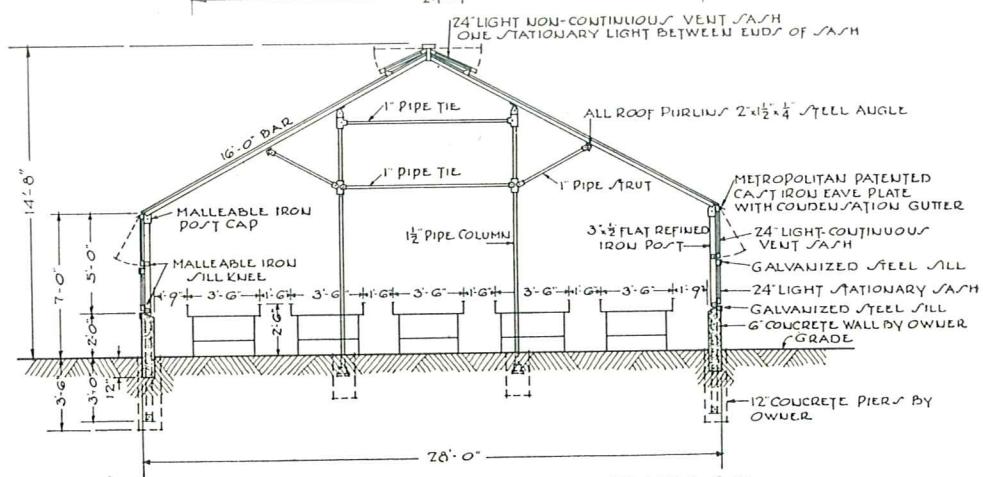
**Semi-iron-frame greenhouses, high-eave  
with iron eave plate and steel sill**



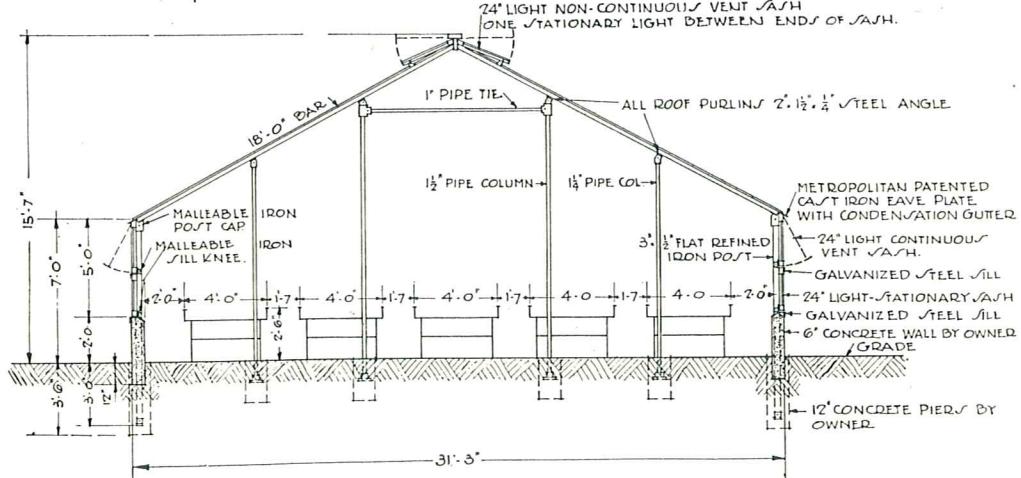
**No. 1528**—Width, 8 ft. 0 in.—Passage house for connecting larger houses to each other.



**No. 1541**—Width, 24 ft. 4 in.—A good 4-bench greenhouse for cut flower growing. Ideal length, 150 ft.



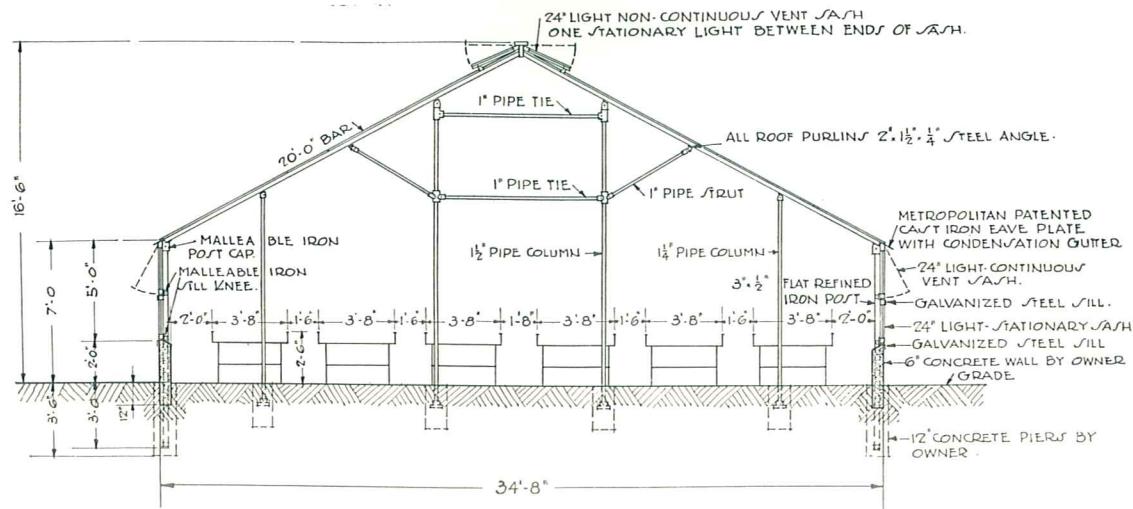
**No. 1542**—Width, 28 ft. 0 in.—A 5-bench greenhouse that can be built to good advantage in lengths up to 150 ft. An arrangement with 4 benches 4 ft. 6 in. wide and 2 side walks 2 ft. 0 in. wide can be used.



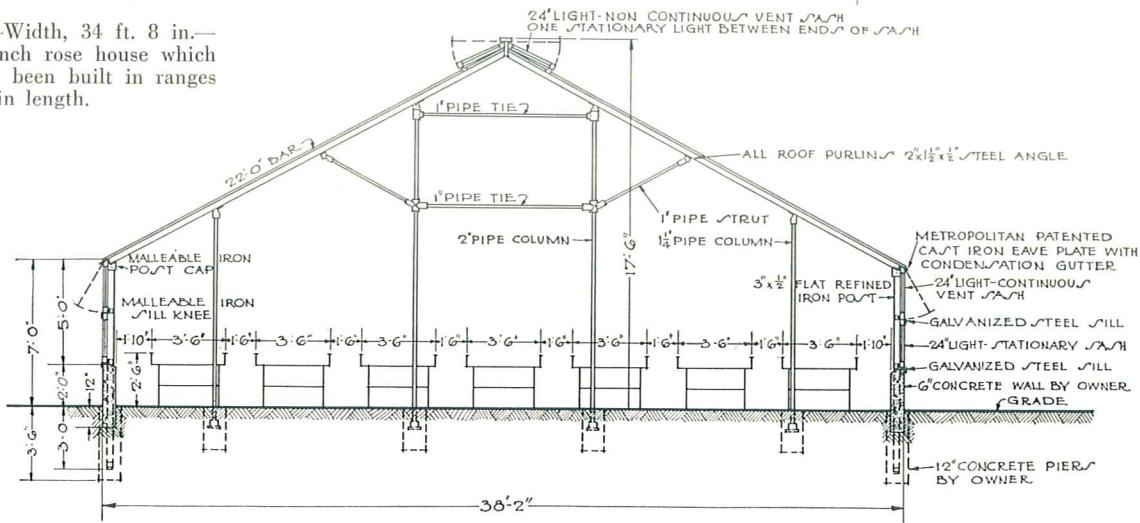
**No. 1543**—Width, 31 ft. 3 in.—Excellent 5-bench house with benches of very desirable width. Lengths, up to 200 ft.



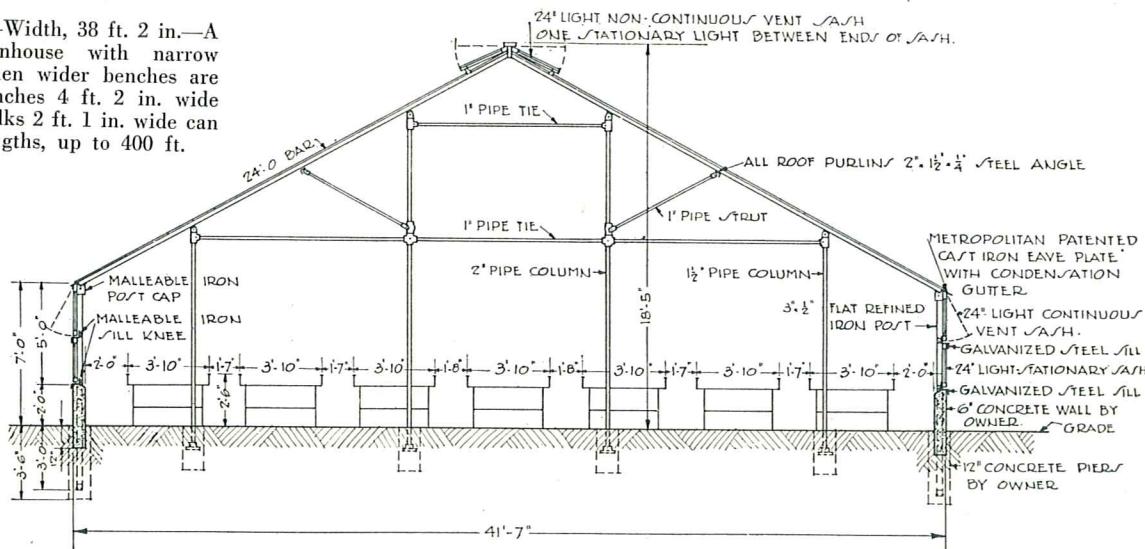
METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N. Y.



**No. 1544**—Width, 34 ft. 8 in.—An ideal 6-bench rose house which has frequently been built in ranges up to 400 ft. in length.



**No. 1545**—Width, 38 ft. 2 in.—A 7-bench greenhouse with narrow benches. When wider benches are desired, 6 benches 4 ft. 2 in. wide and 2 side walks 2 ft. 1 in. wide can be used. Lengths, up to 400 ft.



**No. 1546**—Width, 41 ft. 7 in.—A 7-bench house using medium width benches. The bench arrangement can be changed to 6 benches 4 ft. 7 in. wide and 2 side walks 2 ft. 0 in. wide. Lengths, up to 400 ft.



## Metropolitan Semi-iron-frame Greenhouses, low-eave with wooden eave and sill

Low-eave type in widths  
from 8 ft. to 41 ft. 7 in.

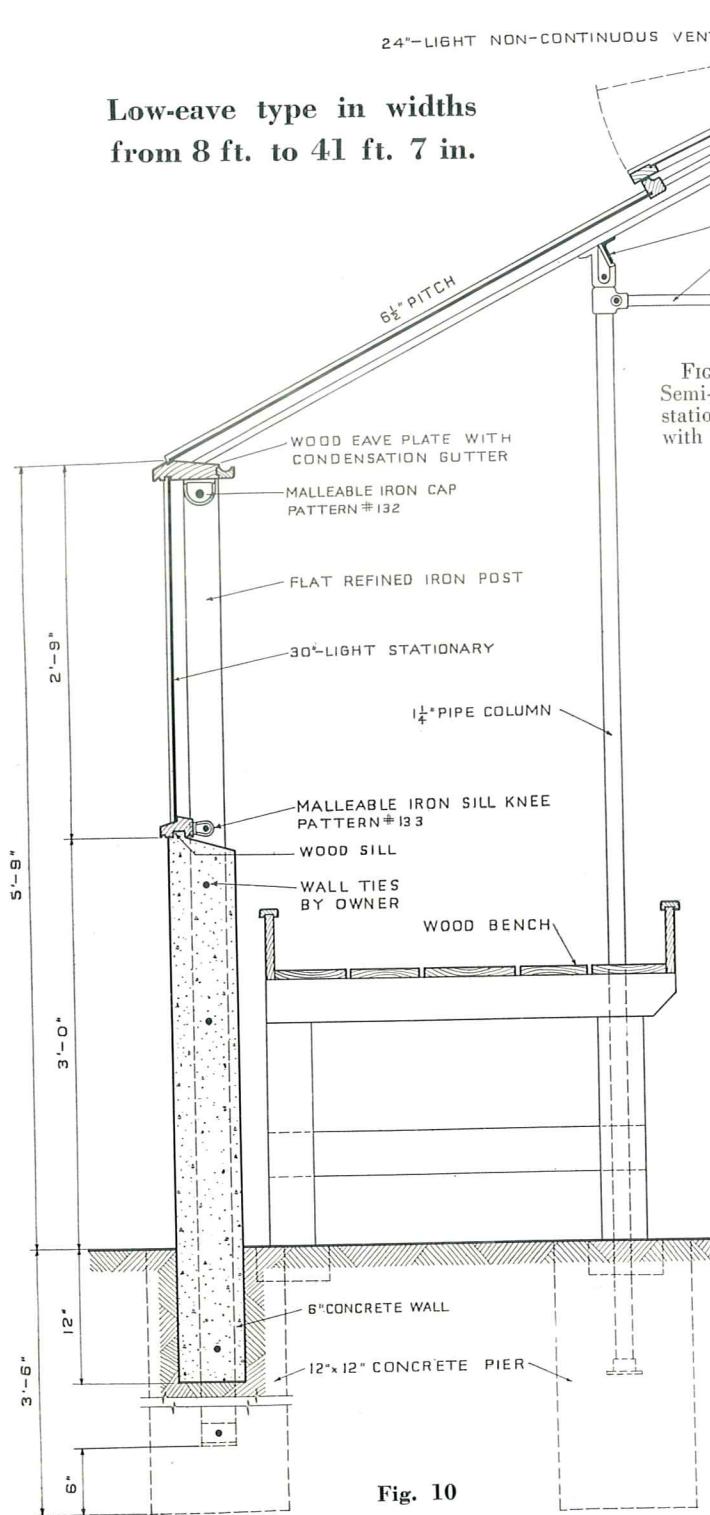


Fig. 10

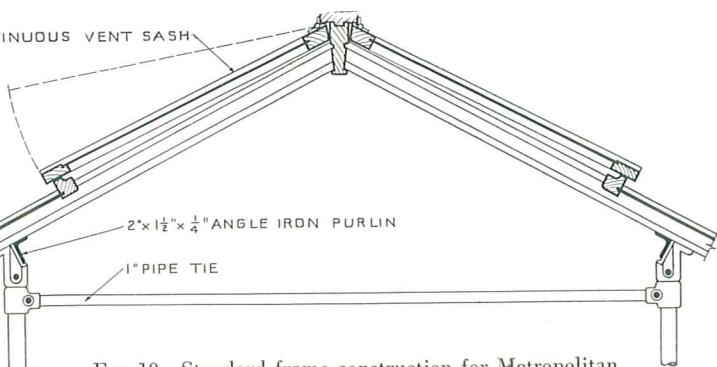


FIG. 10. Standard frame construction for Metropolitan Semi-iron-frame Greenhouses of the low-eave type with stationary glass showing section and details at posts with wooden eaves and sills on concrete wall.

As these greenhouses are the most economical that can be bought where modest first cost is essential, they appeal strongly to the beginner who has a limited amount of money to spend.

They are identical with the Metropolitan Semi-iron-frame Greenhouses shown on Pages 51 to 56, except that wooden eaves replace the Metropolitan Cast-iron Eave Plate, wood is always used for the sills, and in the case of connected houses, wooden gutter construction replaces the Metropolitan Channel-iron Gutter.

The eave plate and sill are fastened to malleable fittings which are bolted to the posts. The bottom of the eave plate is grooved and the top of the sill lipped to hold the stationary glass, and when side ventilation is employed, the sash is hinged to a header underneath the eave. Side ventilating sash bottoms fit against an adjustable sash stop attached to the sill.

"The frame, bars, glass, etc., in my Metropolitan Greenhouse are fine, the construction is stronger than others I know of, and the cost was lower. I expect to patronize Metropolitan again."  
—Charles A. Cramer, Poughkeepsie, N. Y.



METROPOLITAN GREENHOUSE MFG. CORP.  
BROOKLYN, N.Y.

## Metropolitan Semi-iron-frame greenhouses, low-eave with wooden eave and sill

Low-eave type in widths from 8 ft. to 41 ft. 7 in.

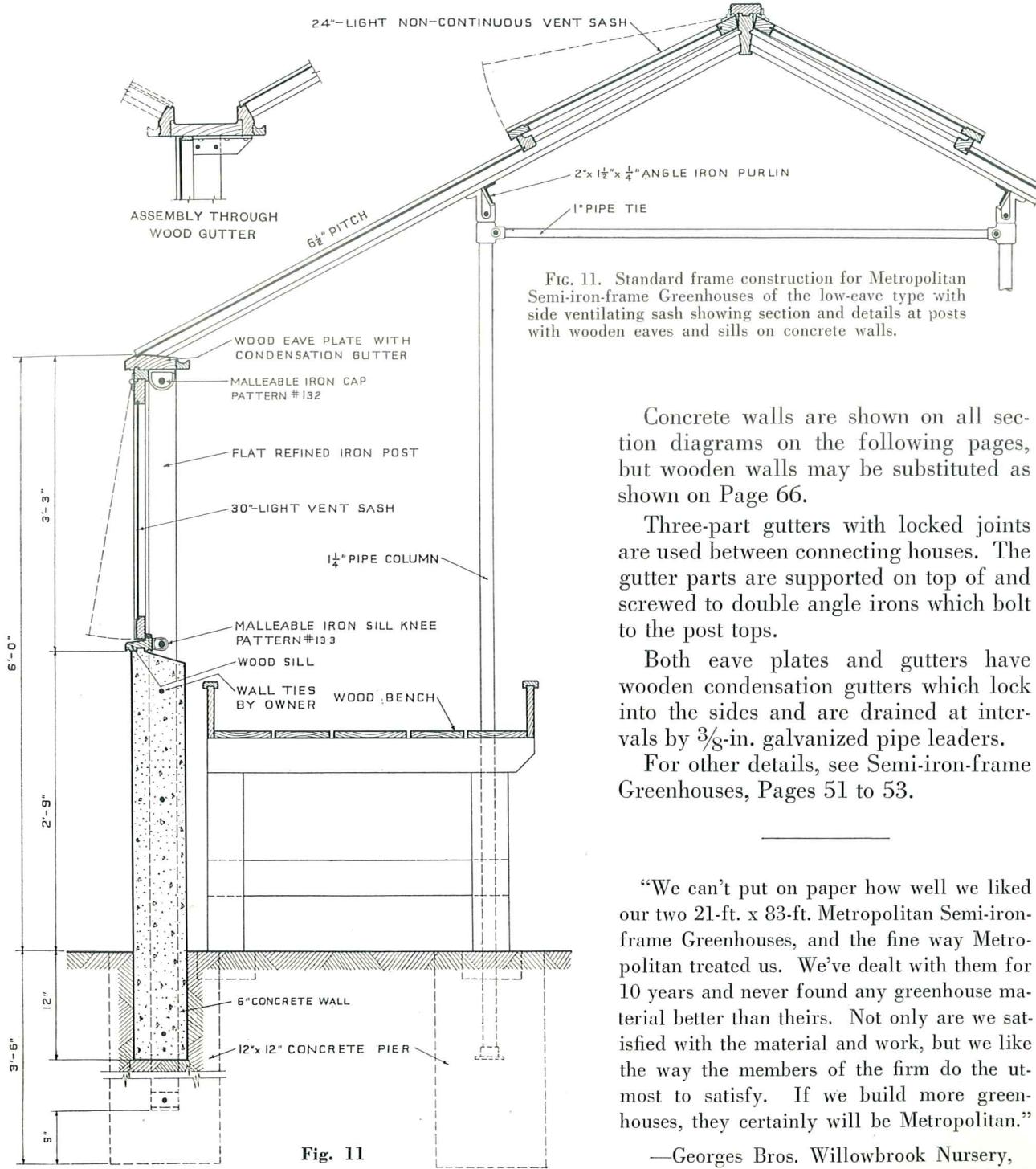


Fig. 11

FIG. 11. Standard frame construction for Metropolitan Semi-iron-frame Greenhouses of the low-eave type with side ventilating sash showing section and details at posts with wooden eaves and sills on concrete walls.

Concrete walls are shown on all section diagrams on the following pages, but wooden walls may be substituted as shown on Page 66.

Three-part gutters with locked joints are used between connecting houses. The gutter parts are supported on top of and screwed to double angle irons which bolt to the post tops.

Both eave plates and gutters have wooden condensation gutters which lock into the sides and are drained at intervals by  $\frac{3}{8}$ -in. galvanized pipe leaders.

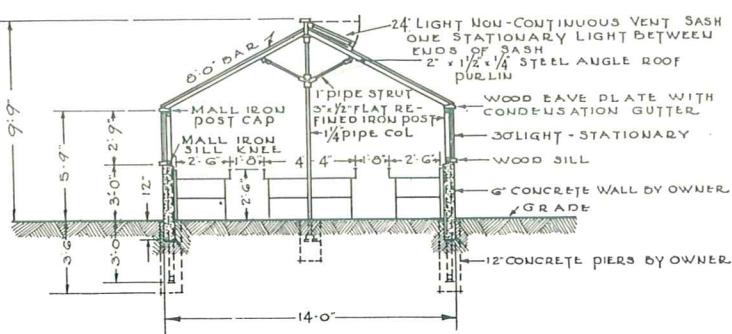
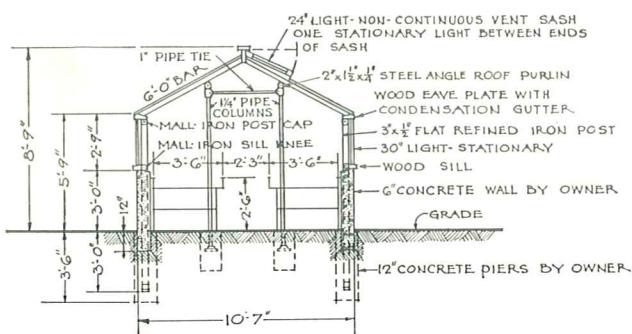
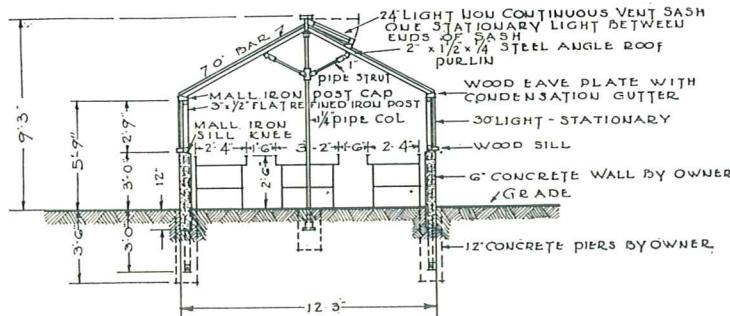
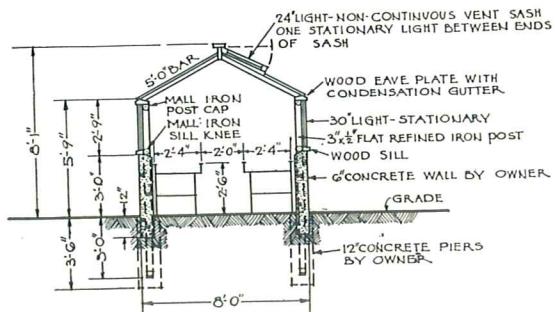
For other details, see Semi-iron-frame Greenhouses, Pages 51 to 53.

"We can't put on paper how well we liked our two 21-ft. x 83-ft. Metropolitan Semi-iron-frame Greenhouses, and the fine way Metropolitan treated us. We've dealt with them for 10 years and never found any greenhouse material better than theirs. Not only are we satisfied with the material and work, but we like the way the members of the firm do the utmost to satisfy. If we build more greenhouses, they certainly will be Metropolitan."

—Georges Bros. Willowbrook Nursery,  
Port Richmond, Staten Island.



**Semi-iron-frame greenhouses, low-eave  
with wooden eave and sill**



**No. 1527**—Width, 8 ft. 0 in.—Passage house for joining larger houses to each other or to the service house.

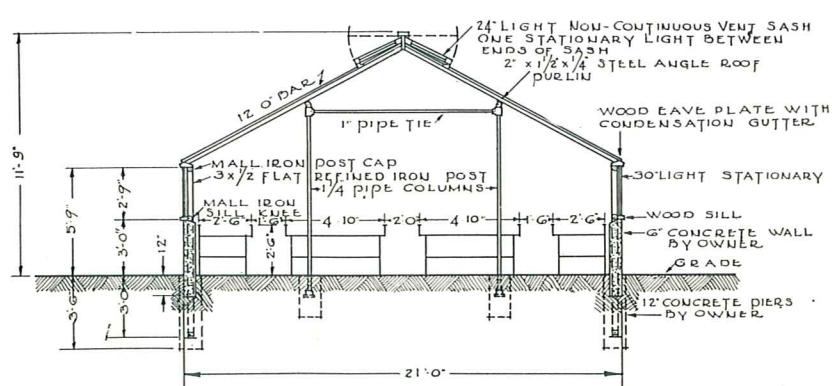
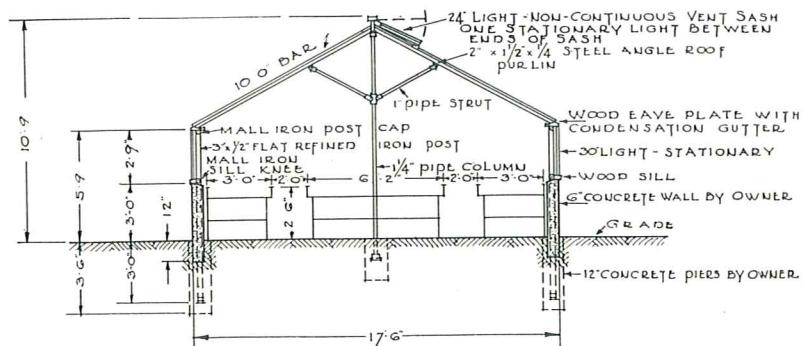
**No. 1547**—Width, 10 ft. 7 in.—A small greenhouse for private use and for propagating. Length, 25 ft.

**No. 1548**—Width, 12 ft. 3 in.—A 3-bench greenhouse for private use and propagating. Length, 25 ft.

**No. 1549**—Width, 14 ft. 0 in.—A 3-bench greenhouse with more bench space than No. 1548 and suitable for lengths up to 50 ft.

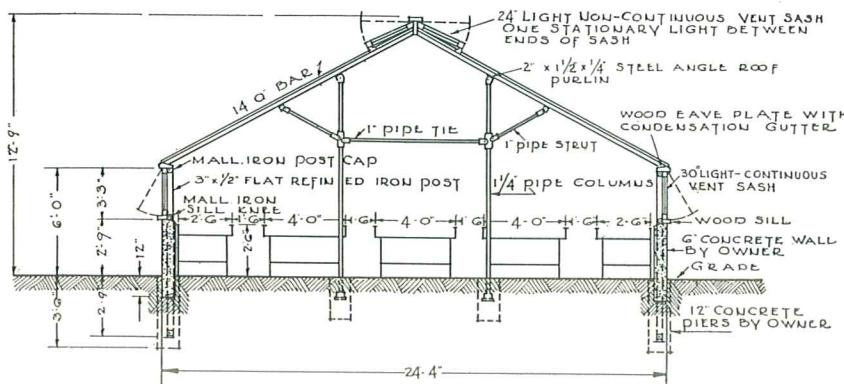
**No. 1550**—Width, 17 ft. 6 in.—Recommended where a wide center bench is wanted. Lengths, up to 100 ft.

**No. 1551**—Width, 21 ft.—A standard 4-bench greenhouse for lengths up to 150 ft. Ideal for a beginner.

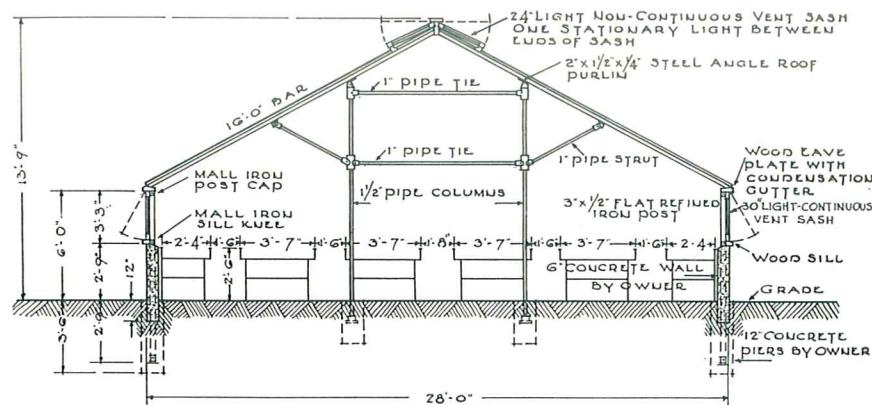




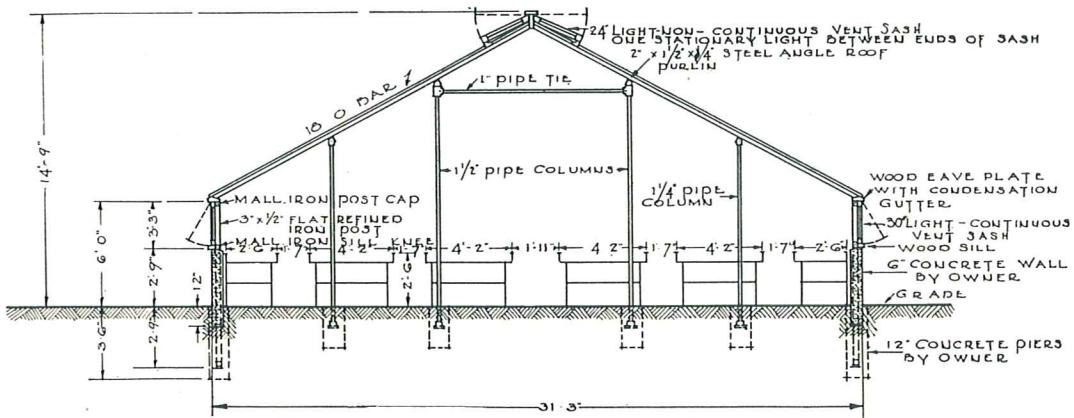
**Semi-iron-frame greenhouses, low-eave  
with wooden eave and sill**



**No. 1552**—Width, 24 ft. 4 in.—Where wider benches are desired with the above house, 2 side benches 2 ft. 9 in. wide and 2 center benches 5 ft. 9 in. wide can be installed. Where side walks are preferred, 4 center benches 3 ft. 8 in. wide and 2 side walks 2 ft. wide can be used. See No. 1541, Page 58. Lengths, up to 150 ft.



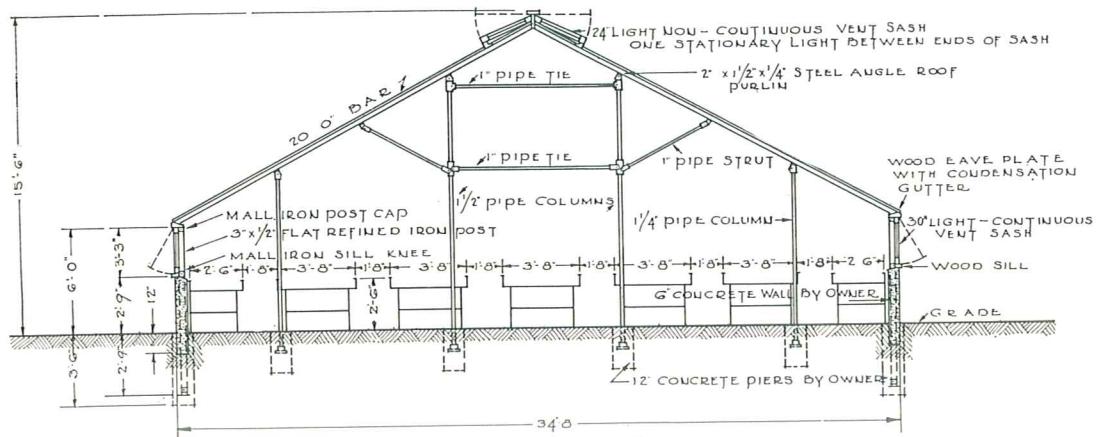
**No. 1553**—Width, 28 ft. 0 in.—Standard 6-bench greenhouse for general use. The above house can be built with 3 benches 5 ft. wide and two side benches 2 ft. 6 in. wide. Where side walks are desired, 5 benches 3 ft. 6 in. wide and 2 side walks 1 ft. 9 in. wide can be installed as shown on No. 1542, Page 58, or 4 benches 4 ft. 6 in. wide and 2 side walks 2 ft. wide can be used instead. Lengths, up to 150 ft.



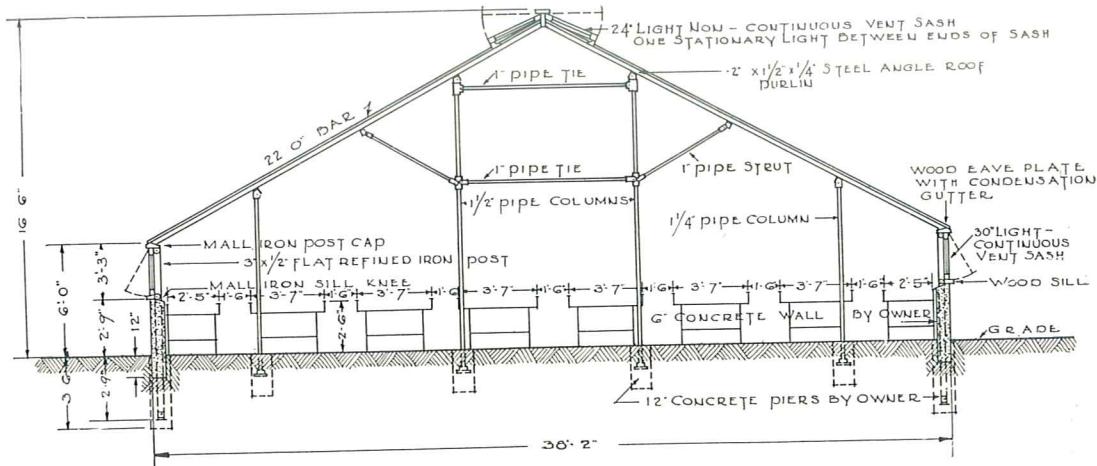
**No. 1554**—Width, 31 ft. 3 in.—Where wider benches are wanted in the above house, 2 side benches 3 ft. wide and 3 center benches 5 ft. 9 in. wide can be used. Where side walks are preferred 5 benches 4 ft. wide and 2 side walks 2 ft. wide can be used as shown on No. 1543, Page 58. Lengths, up to 200 ft.



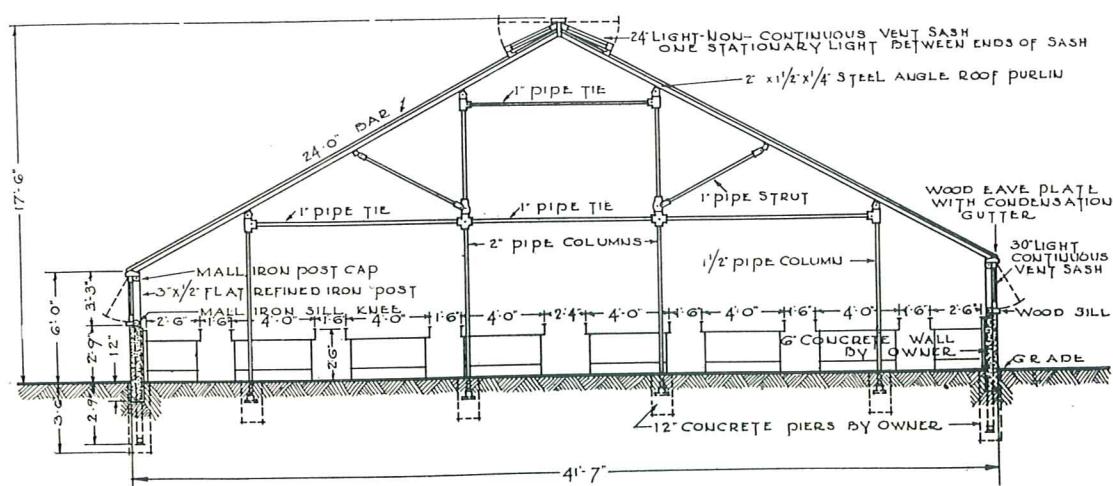
**Semi-iron-frame greenhouses, low-eave  
with wooden eave and sill**



**No. 1555**—Width, 34 ft. 8 in.—Where wider benches are preferred, 4 benches 5 ft. wide and 2 side benches 2 ft. 6 in. wide can be used. When side walks are wanted, the same arrangement as shown on No. 1544, Page 59, with 6 benches 3 ft. 8 in. wide and 2 side walks 2 ft. wide can be used. Lengths, up to 400 ft.



**No. 1556**—Width, 38 ft. 2 in.—The bench arrangement can be changed to 5 benches 4 ft. 4 in. wide and 2 side benches 2 ft. 9 in. wide. When side walks are preferred, 7 benches 3 ft. 6 in. wide and 2 side walks 1 ft. 10 in. wide can be used as shown on No. 1545, Page 59, or 6 benches 4 ft. 2 in. wide and 2 side walks 2 ft. 1 in. wide can be used.



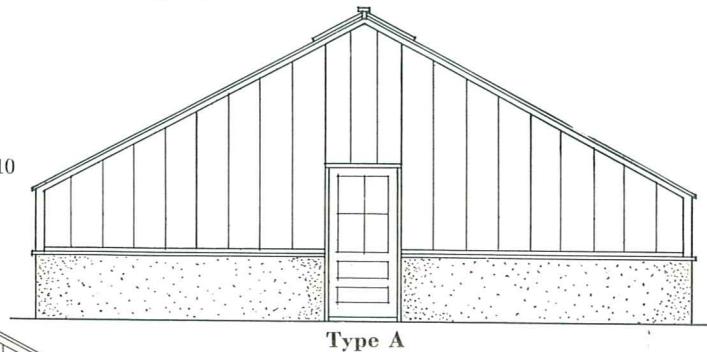
**No. 1557**—Width, 41 ft. 7 in.—An 8-bench house for growing cut flowers. For bench arrangement with narrower benches, see No. 1546, Page 59. Lengths, up to 400 ft.



## Types of Metropolitan Gables

### Type A Gable

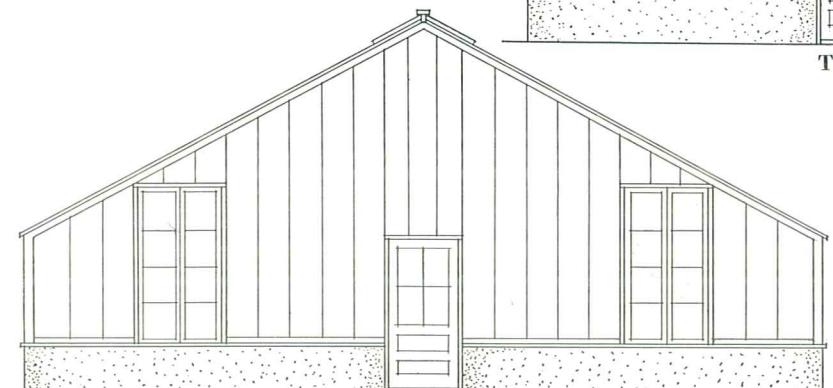
with one standard 3 ft. 0 in. x 6 ft. 10 in. door.



Type A

### Type B Gable

with one standard 3 ft. 0 in. x 6 ft. 10 in. door and 2 pairs of filling sash with an opening of 3 ft. 6 in. x 7 ft. 0 in. These sash afford easier access to the benches and ground beds when removing the soil with wheel barrows.



Type B

### Type C Gable

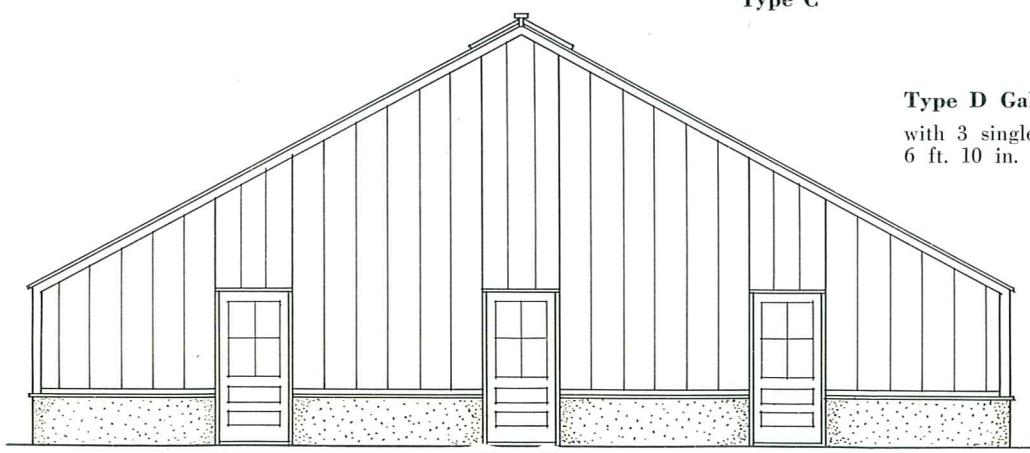
with triple doors providing an opening 9 ft. wide and 6 ft. 10 in. high.



Type C

### Type D Gable

with 3 single doors each 3 ft. 0 in. x 6 ft. 10 in.



Type D



## Metropolitan wooden side wall construction

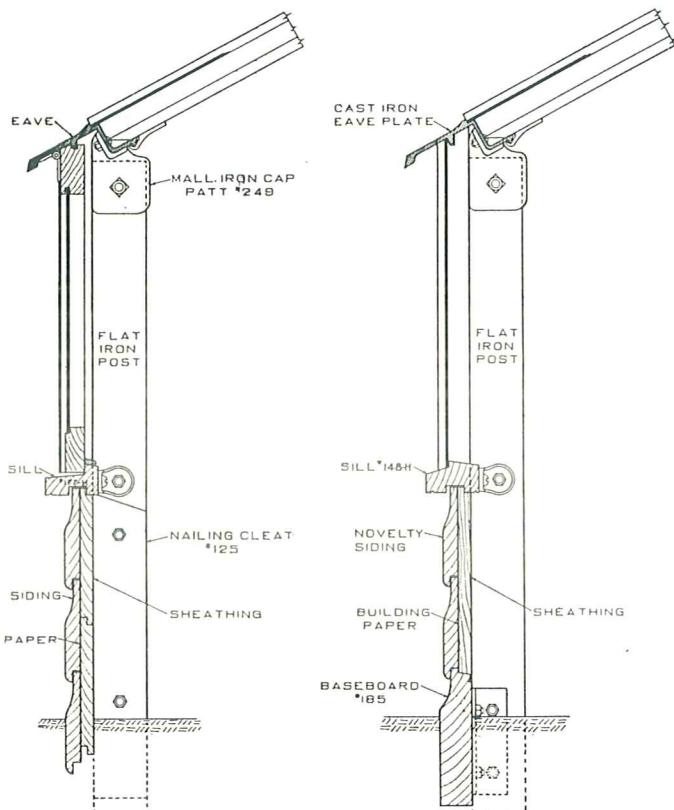


Fig. 12

Fig. 13

ANY Metropolitan Greenhouse may be built with wooden sills and wooden walls instead of concrete walls. Double malleable angle knees bolted to the posts and fastened to the sill with screws hold the sill in place.

FIG. 12—Shows a typical side wall construction with novelty siding and horizontal ship-lapped sheathing.

FIG. 13—Shows a typical side wall construction with horizontal novelty siding, vertical sheathing and baseboard. The baseboard is bolted to the posts by double angles and the lengths of sheathing are toe-nailed at top and bottom.

With either arrangement, tarred building paper is placed between sheathing and siding to prevent infiltration of cold air. Walls so constructed and well painted hold the heat well and are as durable as wooden walls can be made.



### For 30 years this firm has built Metropolitan Greenhouses

PHILLIP HAAS of College Point, L. I., has bought Metropolitan Greenhouses for over 30 years. Now his two sons are grown up, know their business, know good greenhouse construction, and are following in their father's footsteps. The present

firm of Phillip Haas' Sons has built none but Metropolitan Greenhouses, some of which are shown in the picture. The latest additions are a 23-ft. x 142-ft. semi-iron-frame house and a lean-to 6 ft. 3 in. wide x 91 ft. long.



## Metropolitan Standard Benches

METROPOLITAN Benches are in three types as follows:

ALL-WOOD—The cheapest, but practical and durable for general use.

WOOD WITH PIPE-FRAME SUPPORT—Moderate in price and very strong. The alignment remains perfect in years of service and renewal is confined to the bench bottom and sides.

TILE OR SLATE WITH ALL-PIPE FRAME OR PIPE FRAME WITH STRUCTURAL IRON SUPPORT—These benches are practically indestructible, require no overhauling and preserve their handsome appearance for the life of the house. They should be used in display houses and wherever the very best construction is wanted. On this basis they cost no more in the long run and are a continued source of pride to their owners.

### Metropolitan all-wood benches

THE bottom boards are of rough pecky cypress and other wooden parts are of common cypress. The sides are dressed, have caps to match, and are held by certified malleable fittings.

FIG. 152—Lengthwise bottom boards 1 in. x 6 in.; cross pieces, 2 in. x 4 in.; legs 2 in. x 3 in. or 2 in. x 4 in. Ties, 1 in. x 3 in., or 1 in. x 4 in. Side pieces, 1 in. x 6 in. The side support fittings are screwed to the bench side and nailed to the cross-piece.

FIG. 153—Crosswise bottom boards. Stringers 2 in. x 4 in.; Side pieces, 1 in. x 6 in.; Legs, 2 in. x 3 in. or 2 in. x 4 in. Cross ties 1 in. x 3 in. or 1 in. x 4 in.

### Metropolitan pipe-frame benches

THE bottom boards are of rough common cypress and the side boards are of dressed common cypress with cap to match. The frames are of 1-in. black or galvanized pipe and the fittings are grey-iron castings.

FIG. 154—for lengthwise bottom boards. Bottom and side boards, 1 in. x 6 in.

FIG. 155—For crosswise bottom boards. Bottom boards of random widths and cut to necessary length. Side boards 1 in. x 6 in. Bench wiring frame extra equipment.

### Metropolitan tile or slate-bottom benches

THE legs and cross ties are of 1-in. galvanized pipe with grey-iron fittings and the bench bottom bearers are of tee-iron with angle irons at the edges. Bench bottoms of interchangeable moulded tiles or slate slabs. Sides, angle iron for potted plants, or slate or 1-in. x 6-in. dressed common cypress for solid bench. The wooden side has cap to match. Slate side pieces are cut to exact length and drilled to receive iron fastenings.

FIG. 156—Tile-bottom bench with 1-in. x 6-in. common cypress sides and cap to match. Also furnished all-pipe frame.

FIG. 158—Tile-bottom bench with slate sides.

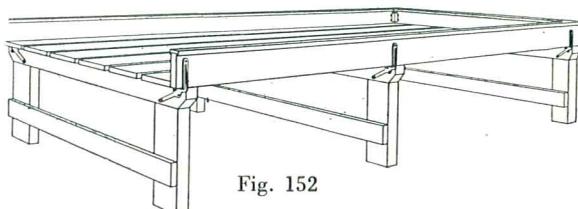


Fig. 152

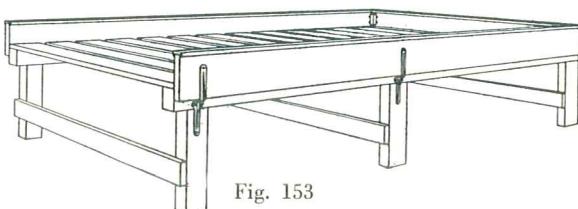


Fig. 153

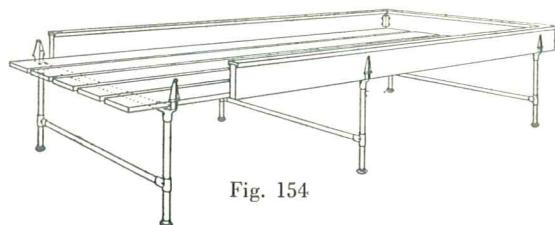


Fig. 154

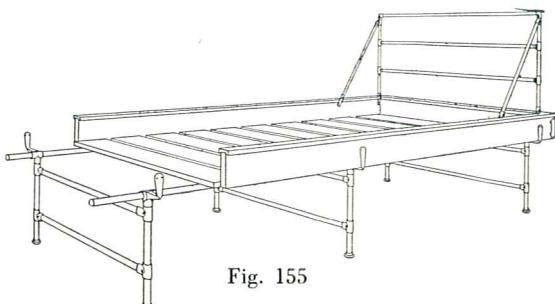


Fig. 155

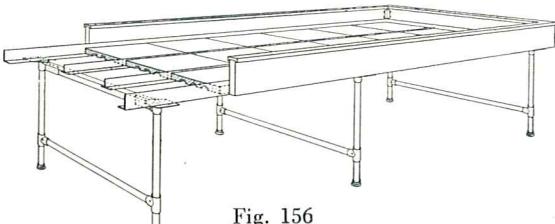


Fig. 156

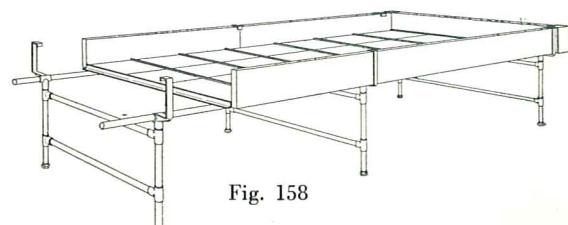


Fig. 158



## Heating systems in Metropolitan Greenhouses

WHETHER we suggest the heating system, supply the heating material or do the erection is optional with the customer. If he prefers to do the installing, we can supply all necessary material, including Metropolitan Boilers of any desirable size and type and also furnish the plans, details and specifications without extra charge. Heating boilers, pipe and heating system auxiliaries are described in our Bulletin No. 1127 which will be mailed on request.

Where the heating contract is placed with us, our Engineers design the most desirable system, supervise all installation details, assume complete responsibility, and deliver the plant with satisfactory proof that every guarantee has been fully met.

Either steam or hot-water system may be used to heat any Metropolitan Greenhouse, but in smaller plants hot water is often preferred because sudden temperature changes are more easily avoided without a fireman in constant attendance.

If a cellar can be provided, the boiler is placed below grade. This installation is generally known as the gravity system. If boiler cellar is not practical, an overhead heating system can be installed by placing the boiler only about two feet below grade, and the flow mains overhead in the houses.

Large plants or very large houses can be heated with hot water with the assistance of a pump to accelerate circulation. This installation entails

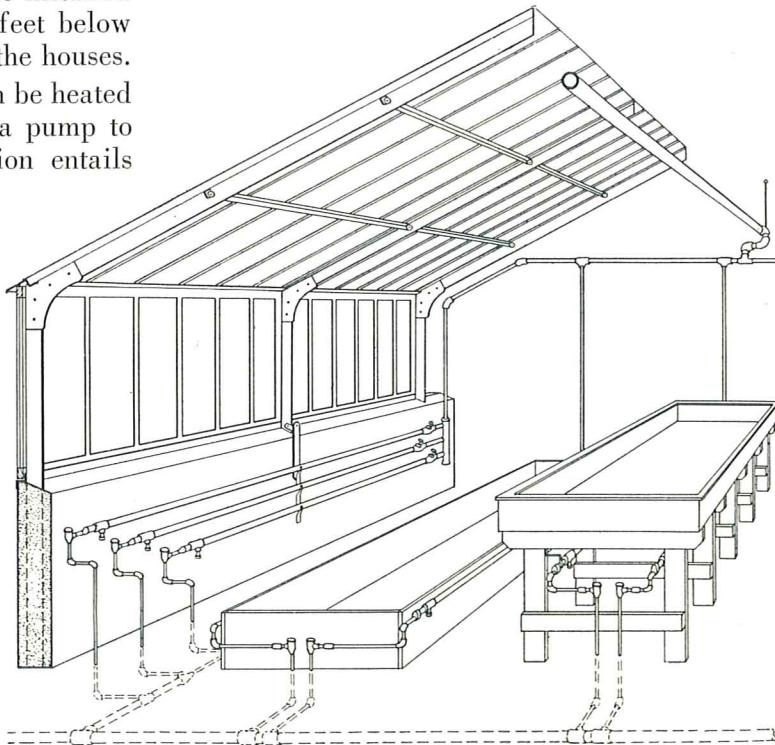
### Metropolitan overhead steam heating system

Method of installing and supporting coils as well as venting air from system for an efficient overhead steam heating system. Note the individual valves, steam trap and clean-out dirt pocket for each line in the coils.

"I couldn't get better houses if I paid more money, and the Metropolitan heating system, too, is exceptional. I am not only saving quite a bit of coal, but the heat is so equally divided in all four houses that there is not one degree of difference."—

Peter J. Buse, Hicksville, I. I.

greater initial expense since more and larger sized pipes and a circulator are required. Therefore we recommend steam systems for such plants. The boiler can be set on grade instead of a deep cellar, to reduce the labor and expense of coal and ash handling and to avoid the cost and dangers of a water-filled cellar. One or two overhead mains in each house feed all coils at the sides, underneath raised benches or at the sides of solid beds. The return end of every steam line is provided with a dirt pocket and steam trap. The dirt pockets on each line catch pipe scale, rust and other internal solid impurities, and permit them to be removed before they can get into the traps to impair valve action. The steam traps confine all live steam to the heating lines where it must do useful work. The condensation and air flow back toward the boiler to a receiver which constantly vents the air to atmosphere and which is fitted with an electrically-driven pump that automatically and intermittently returns the condensation to the boiler every time an accumulation occurs. The initial and operating cost of receiver and pump is more than



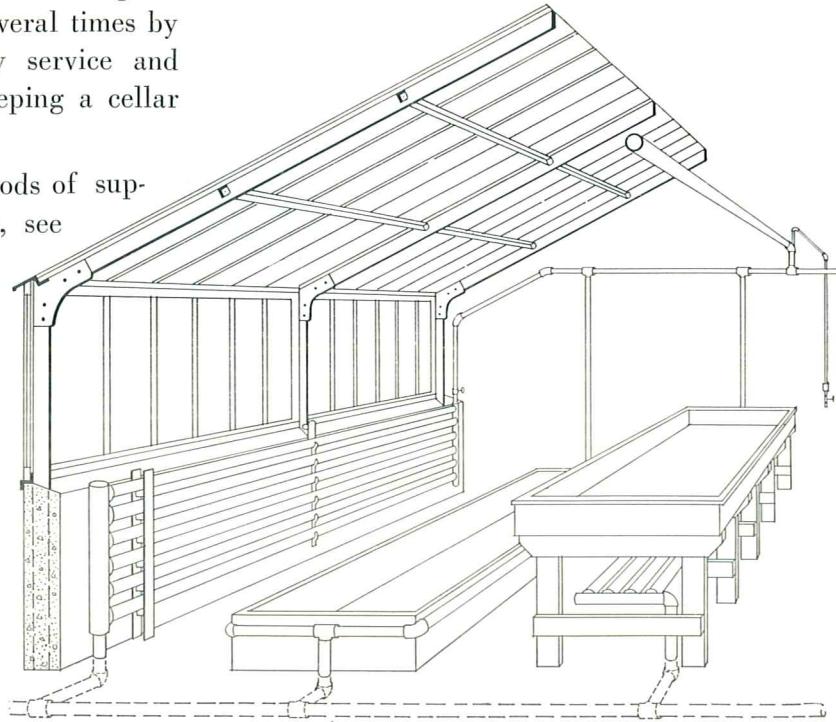


offset by the saving of the expense of setting the boiler in a cellar and is repaid several times by more efficient system, satisfactory service and elimination of the nuisance of keeping a cellar free from water.

For details of Metropolitan methods of supporting pipe coils in greenhouses, see Bulletin No. 1127.

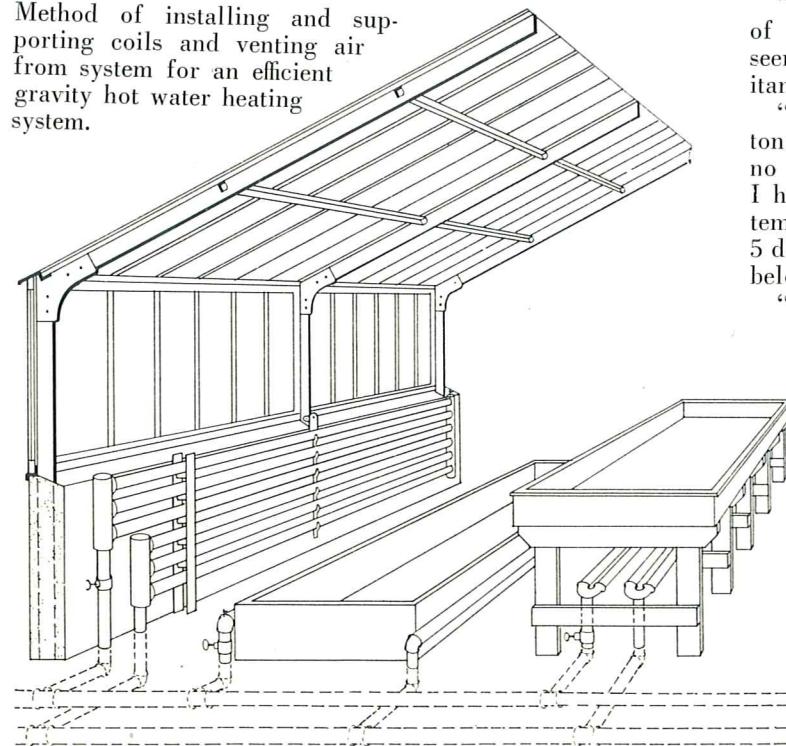
#### Metropolitan overhead hot water heating system

Method of installing and supporting coils as well as venting air from system for an efficient overhead hot water heating system.



#### Metropolitan gravity hot water heating system

Method of installing and supporting coils and venting air from system for an efficient gravity hot water heating system.



"I have at different times fired various kinds of steam and hot-water boilers, but have never seen any other to equal your 9-section Metropolitan Hot water Boiler.

"Although I use soft coal at only \$3.00 per ton plus freight, have a stack but 20 ft. high, use no forced draft and am located on level ground, I have no trouble in maintaining 55-deg. night temperature. Outside temperatures have reached 5 deg. above zero with a 50-mile wind and 4-deg. below zero with little wind.

"You said I would have to use hard coal in very cold weather or watch the fire very closely at night. I have never used hard coal, but in cold weather the fire needs no attention from 8:00 P.M. until 12:30 A.M. or from midnight to 6:00 A.M. But the best is yet to be told. I have fourteen 2-in. pipes in the larger greenhouses and eleven 2-in. pipes in the smaller that have never been used, so you know I am all right for any cold snap that we may some day have.

"You gave me a liberal heating capacity, and credit should be given you for underestimating, instead of overestimating, when selling to me."—H. W. Misson, Southampton, Pa.

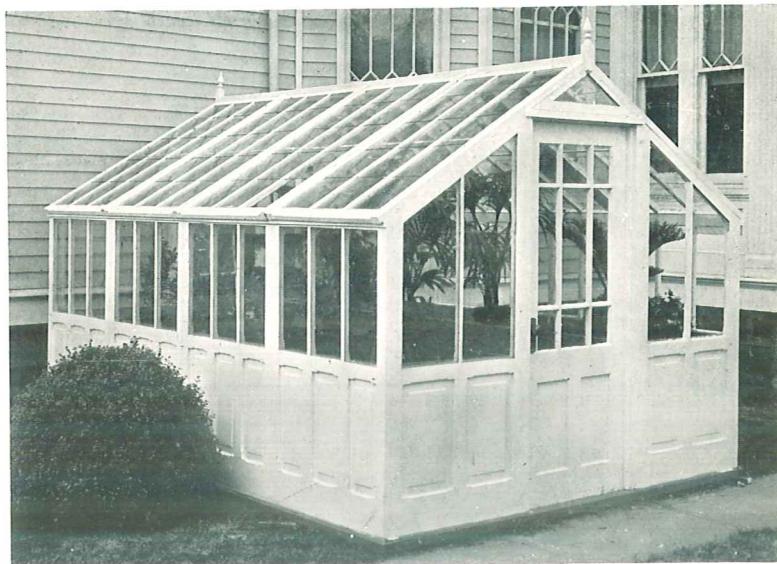


## The Metropolitan Sectional Greenhouse

An attractive addition to the home and a practical small Greenhouse that permits foliage and flowering plants to thrive all year around.

Size, 8½ ft. wide x 12 ft. long. Shipped in sections and easily assembled. No foundation is required.

Any handy man can erect this house with very little effort. It can therefore be sold and erected by any florist to any of his customers who may want home facilities for keeping flowering or foliage plants under good conditions. The florist can make a good profit on the larger sales of plants.



## Metropolitan Sash Houses

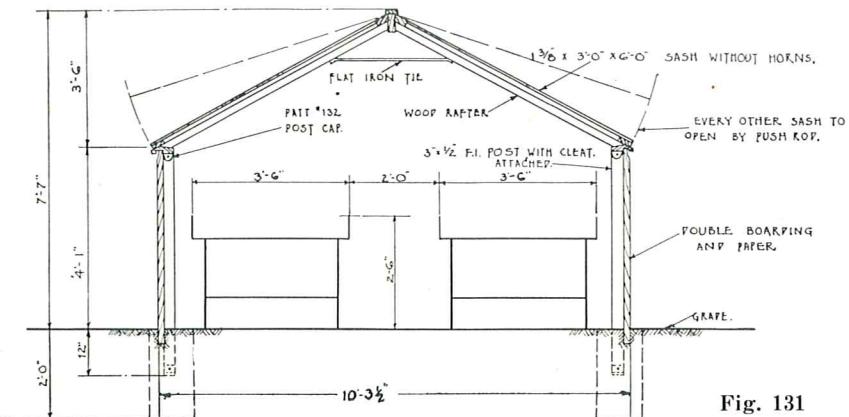


Fig. 131

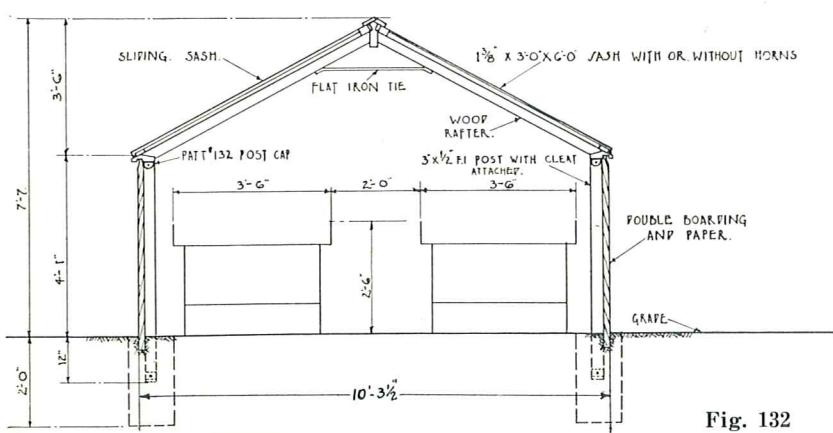


Fig. 132

SASH houses are often practical in an emergency when there is not time to build a regular greenhouse, or where many hotbed sash are used only part of the time for hotbed purposes, and are available for the sash houses at other times. Wood walls as a rule are used.

Two typical designs are shown for utilizing standard Metropolitan Hotbed Sash. A slight variation in roof dimension is permissible by using any of the Metropolitan Sash of different length shown in our Sash Bulletin No. 727, which will be sent on request.

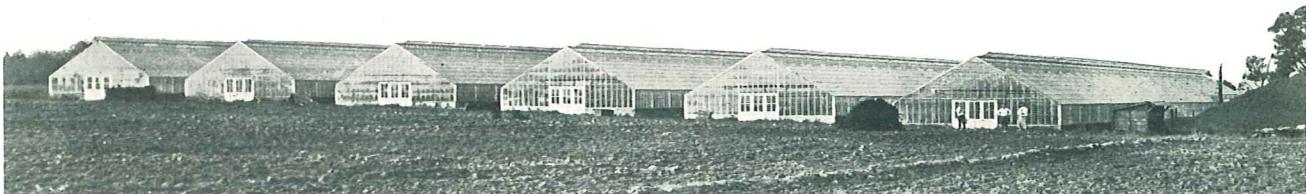
FIG. 131—Built with No. 11 Metropolitan Hotbed Sash without horns. The sash are hinged to the ridge and raised for ventilation by push rods at the lower ends.

FIG. 132—Built with Metropolitan Hotbed Sash, with or without horns. Ventilation is provided in this house by sliding the sash up and down on the rafters.



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MARTIN SAMTMANN and his sons of Chestnut Hill, Pa., are perhaps the country's best growers of roses—at least they have walked away with many prizes. For 20 years previous to going into business for themselves, they were also remarkably successful, and had had experience with greenhouses of about every make, type, size and construction. When they built for themselves, nearly all builders figured on the first two houses, but Metropolitan pleased them best. In addition to the six 35-ft. x 400-ft. Metropolitan Greenhouses shown above they have built several more.

Such discriminating owners would not stick to Metropolitan

unless they got bona fide good value,—top-notch design and materials, good honest able construction service and every guarantee of thorough satisfaction.

Their own words tell the story:

"We started in 1923 with two 35-ft. x 400-ft. Metropolitan houses and have added another every year except in 1925, when we added two. These houses are the strongest of their size we have ever seen and cannot be surpassed. The workmanship and materials such as lumber, hardware, glass and paints are the best that can be put into any house."

# Metropolitan — the *incomparable* greenhouse

By *incomparable* we mean the Webster Dictionary definition—*admitting of no comparison with others, unapproachably eminent, without a peer or equal*

THE salesman who tries to sell you a greenhouse for a bigger price but with less value than found in the Metropolitan is hard put to find arguments. More than one who found Metropolitan bidding has backed off with the frank statement that he could not compete. The knocking type may intimate that the cypress, glass, paint, putty, nails, etc., used by Metropolitan are not so good. He knows that difference in these things can't be detected from the catalog, but he is careful to say nothing about the superiority that is *plainly evident* and *cannot be denied*. Take for instance the extra steep pitch (Page 23), the cast-iron eave plate (Pages 27 and 31), brass nails for the sash bars—all features that cost us more, but make for better performance and tremendous saving in the after years.

*Make the comparisons on these visible features and draw your own conclusions.* But more convincing than anything we can say is the condition of Metropolitan Greenhouses that have seen many years of service. *Go and see a few of them yourself* before making your decision.

If you don't know where to find Metropolitan Greenhouses in your neighborhood, ask us for reference, or let our representative introduce you to owners who will tell you just what you want to know.

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